CCS Technical Documentation
NPM-6/6X Series Transceivers

Troubleshooting Instructions

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Table of Contents

Page No

RF Troubleshooting 4
Introduction to RF troubleshooting 4
RF Key component placement 5
RF Measurement points 6
EGSM900 & GSM1800 Transmitter 7
General instructions for Tx troubleshooting 7
Transmitter troubleshooting diagram 9
Pictures of transmitter signals 12
EGSM900, GSM1800 and GSM1900 Receiver 14
General instructions for Rx troubleshooting 14
Troubleshooting diagram for EGSM900 receiver 18
Troubleshooting diagram for GSM1800 receiver 19
Troubleshooting diagram for GSM1900 receiver 20
Synthesizer 21
General instructions for synthesizer troubleshooting 21
Synthesizer troubleshooting diagram 22
Pictures of synthesizer signals 23
Baseband Troubleshooting 25
BB Measurement points 25
Troubleshooting diagrams 27
FM Radio troubleshooting 48
FM Radio component layout 48
FM Radio troubleshooting diagram 50
Notes to "FM Radio troubleshooting diagram" 50

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RF Troubleshooting

Introduction to RF troubleshooting

Measurements should be done using Spectrum analyzer with high-frequency high-impedance passive probe (LO-/reference frequencies and RF power levels) and Oscilloscope with a 10:1 probe (DC-voltages and low frequency signals)

The RF-section is built around one RF-ASIC (HELGA N500). For easier troubleshooting, this RF troubleshooting document is divided in to sections.

Before changing HELGA, please check following things: Supply voltages are OK and serial communication is coming from baseband to HELGA.

Please note that the grounding of the PA module is directly below PA-module so it is difficult to check or change. **Most RF semiconductors are static discharge sensitive!** So ESD protection must be taken care of during repair (ground straps and ESD soldering irons). HELGA and PA are moisture sensitive so parts must be pre-baked prior to soldering.

Apart from key components described in this document here are a lot of discrete components (resistors, inductors and capacitors) which troubleshooting is done by checking if soldering of the component is done properly (for factory repairs checking if it is missing from PWB). Capacitor can be checked for shortening and resistors for value by means of an ohmmeter, but be aware in-circuit measurements should be evaluated carefully.

Please be aware that all measured voltages or RF levels in this document are rough figures. Especially RF levels varies due to different measuring equipment or different grounding of the used probe. When using RF probe usually a good way is to use metallic tweezers to connect probe ground to PWB ground as close to measurement point as possible.

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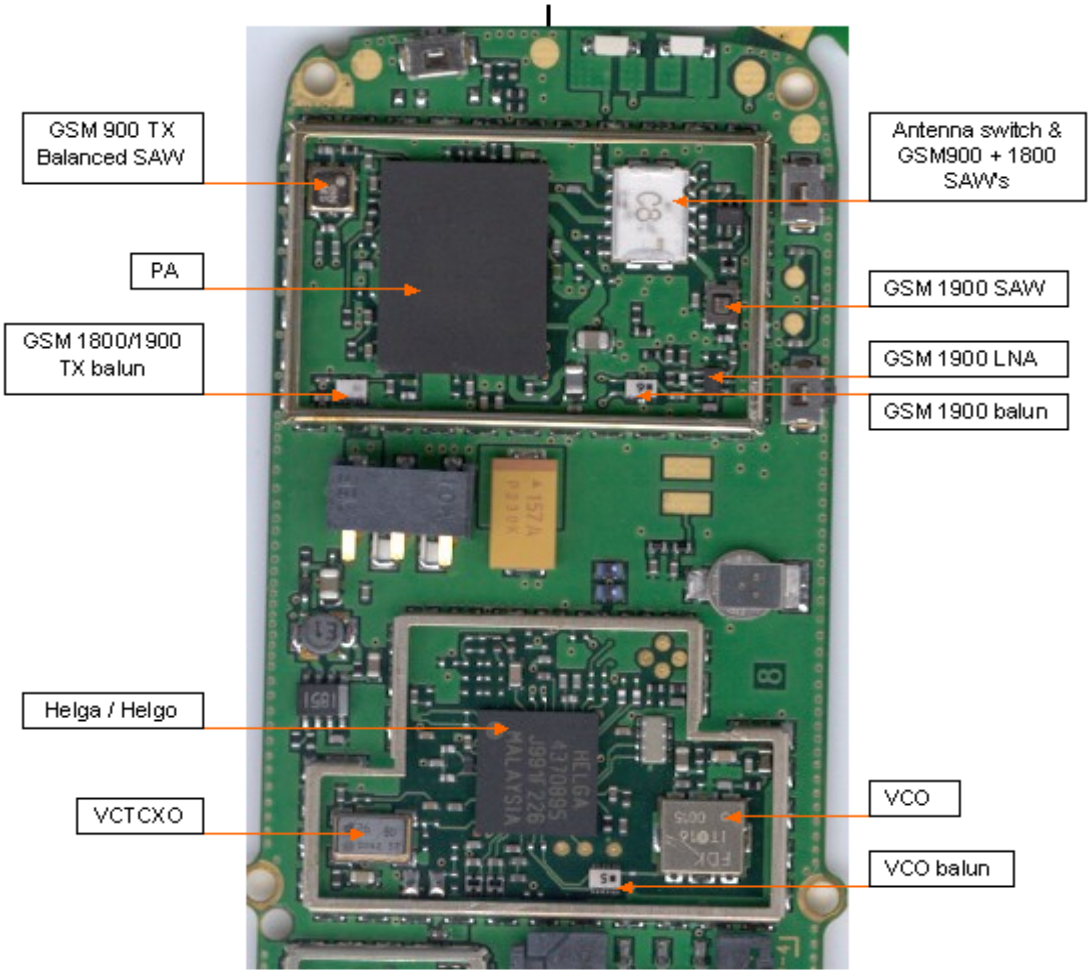
RF Key component placement

Figure 1: Component placement 1



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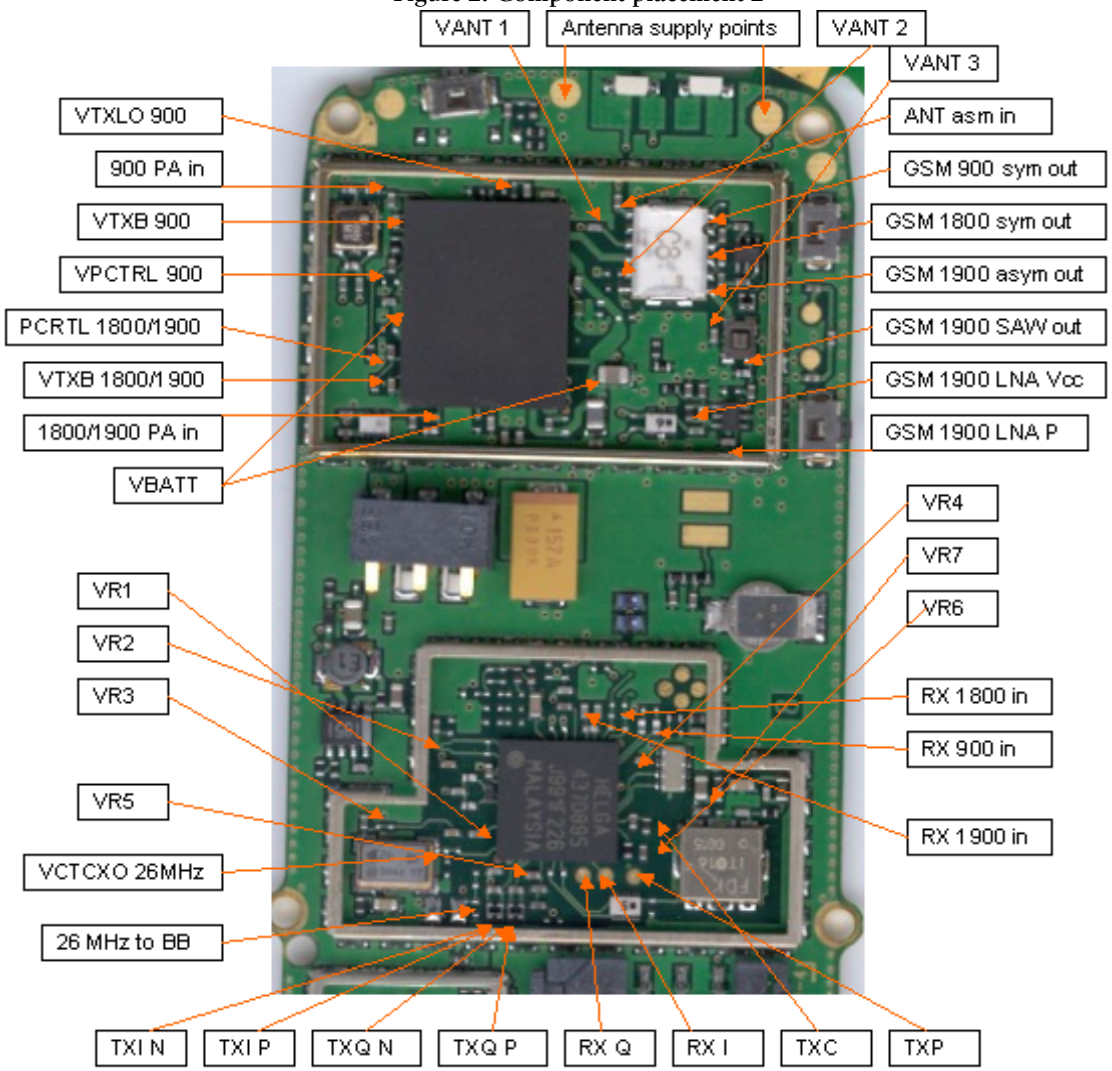
RF Measurement points

Figure 2: Component placement 2



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EGSM900 & GSM1800 Transmitter

General instructions for Tx troubleshooting

Kindly refer to the Service Software Section, Service Concept dagram (p.40)

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply to module test jig with FLC-2 cable.

Attention: When repairing or tuning transmitter use external DC supply with at least 3A current capability. Set the DC supply voltage to 3.9V and set the jumper connector on test jig to "bypass" position.

Connect a RF-cable to the module test jig (MJS-49) RF connector to and to measurement equipment or at least 10dB attenuator, otherfwise the PA may be damaged. Normally Spectrum analyzer is used as measurement equipment.

Attention: Normally Spectrum analyzer maximum input power is +30dBm. It is recommended to use 10dB attenuator on Spectrum analyzer input to prevent damage.

Set the phone module to test jig and start Phoenix service sofware

Initialize connection to phone. (use FBUS driver when using DAU9S and COMBOX driver when using FPS-8)

Select product from the menu

File -> Choose product -> NPM-6

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Maintenance -> Testing -> RF Controls

From the RF controls window

- Select band "EGSM900" or "GSM 1800" or "GSM1900" (Default = "EGSM900")

- Set Active unit to "Tx" (Default = "Rx")

- Set Operation mode to "Burst" (Default = "Burst")

- Set Tx data type to "Random" (Default = "All1")

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- Set Rx/Tx channel to 37 on EGSM900 band or 700 on GSM1800 band or 661 on EGSM1900 (Defaults)

- Set Tx PA mode to "Free" (Default)

- Set power level to 5 (Default = 19) on EGSM900 or to 0 (Default = 15) on GSM1800 or GSM1900

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Transmitter troubleshooting diagram

Figure 3: Transmitter troubleshooting

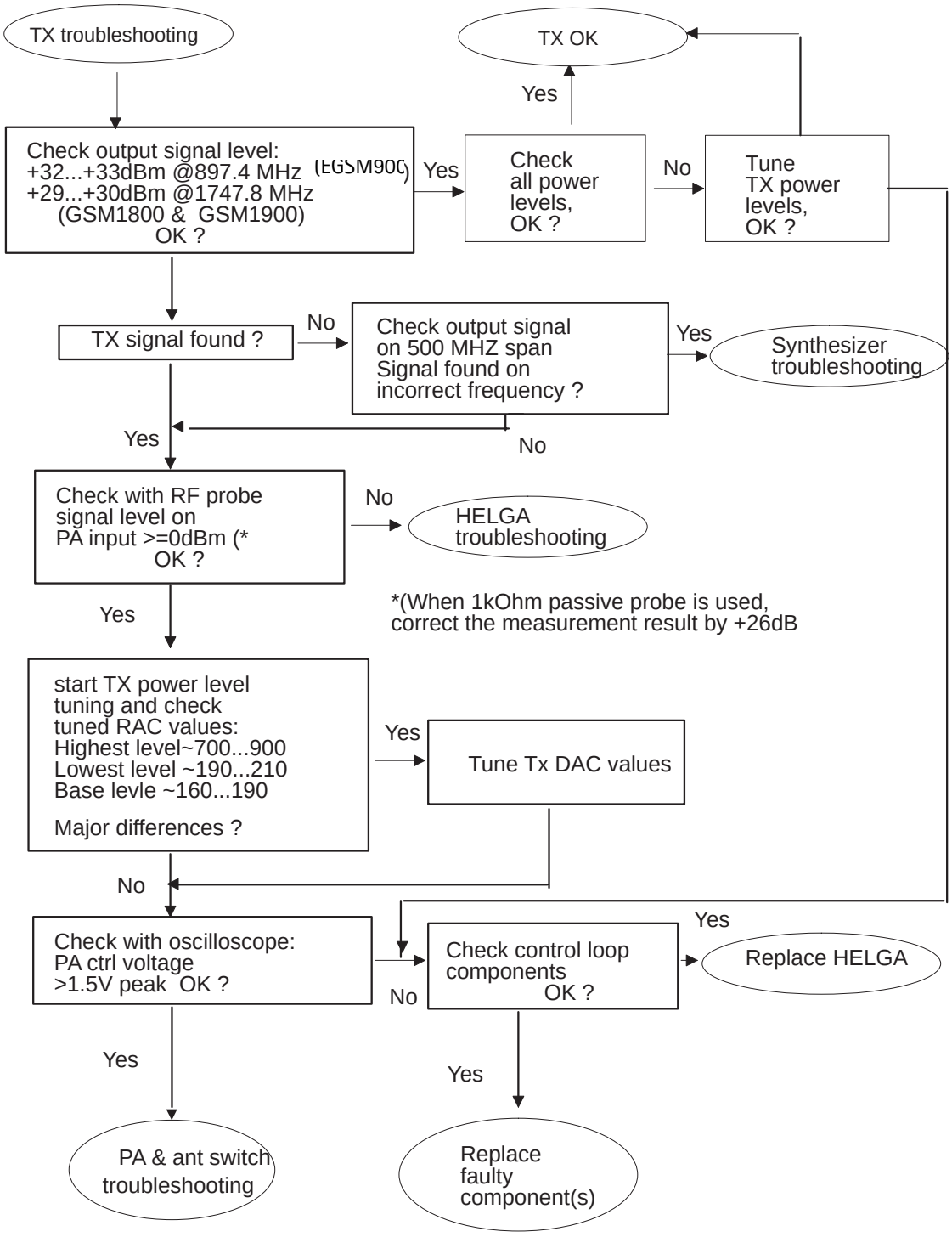

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Figure 4: HELGA IC troubleshooting

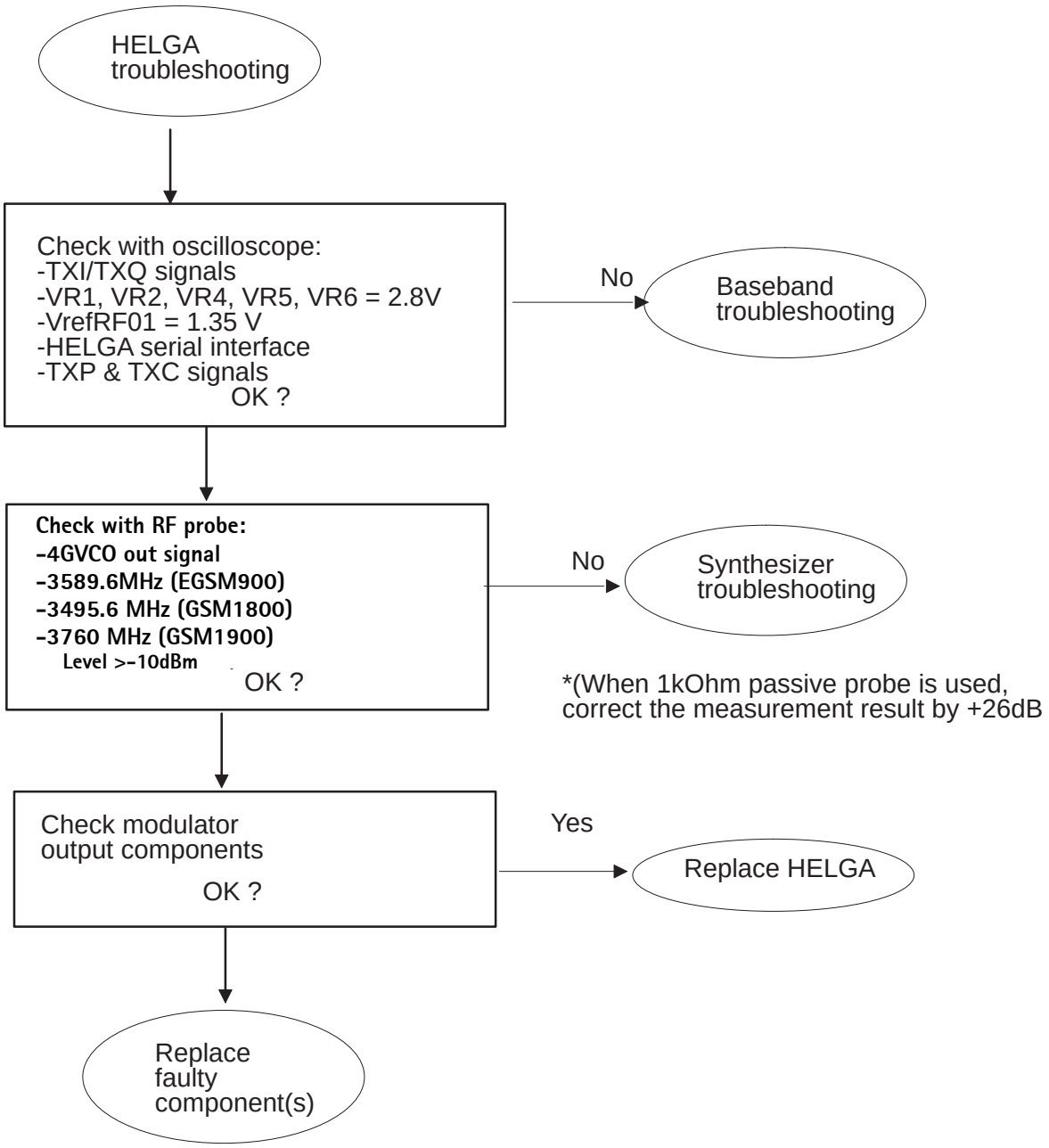

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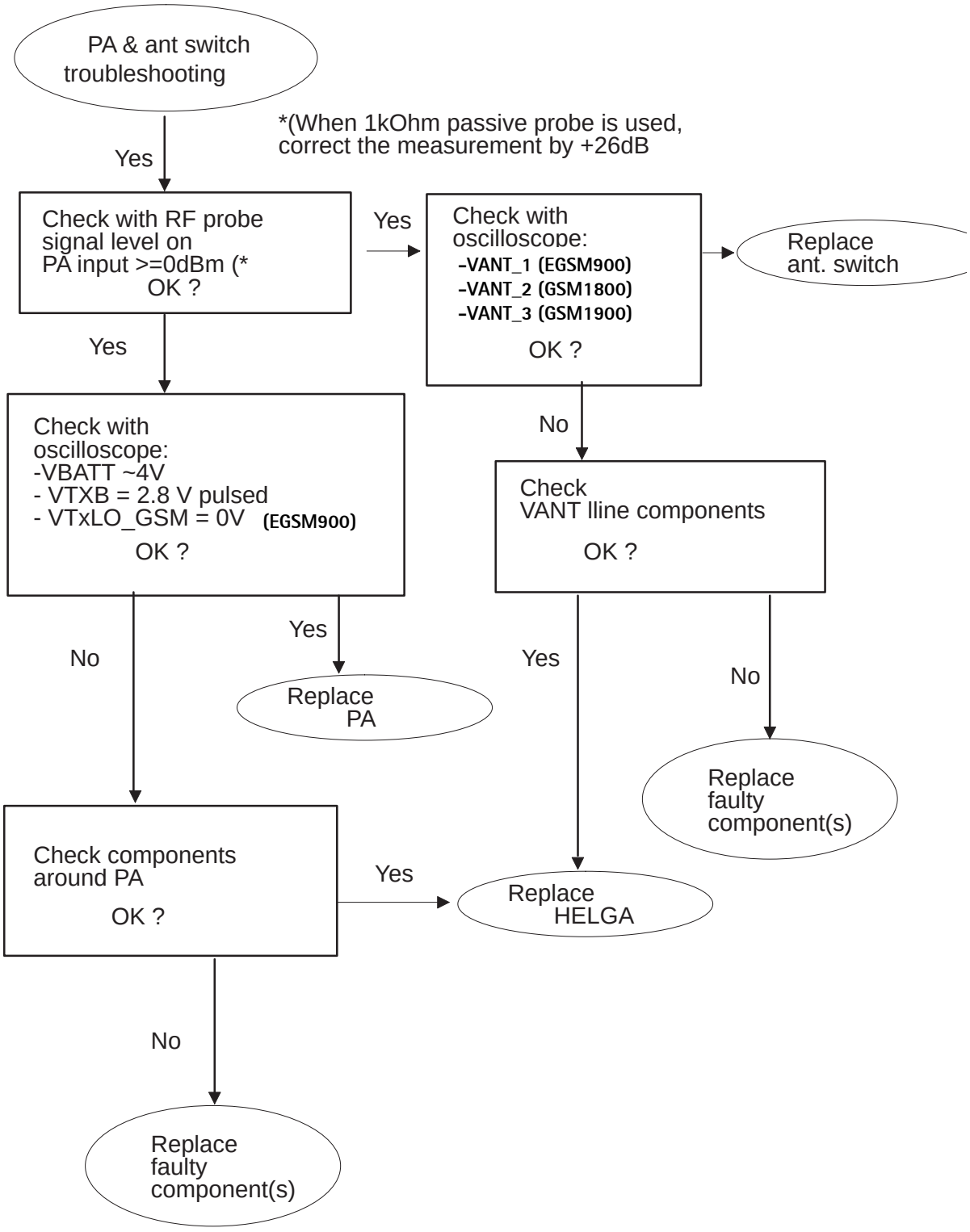
Figure 5: PA and Antenna Switch troubleshooting



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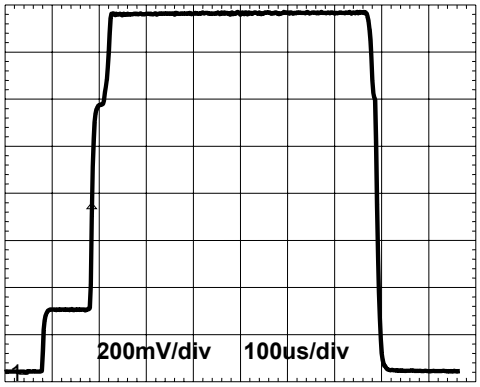
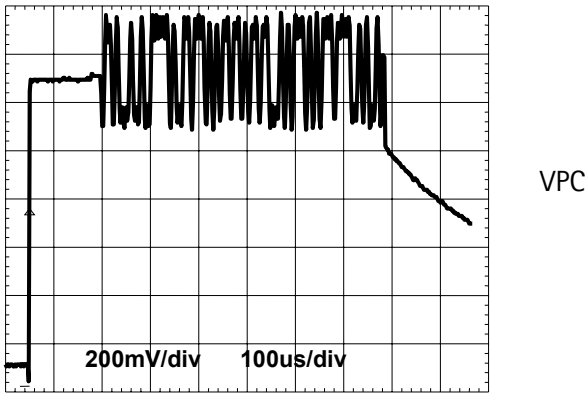
Pictures of transmitter signals

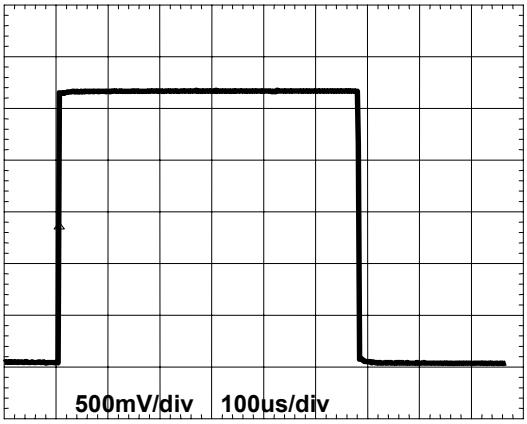
Figure 6: Transmitter signals



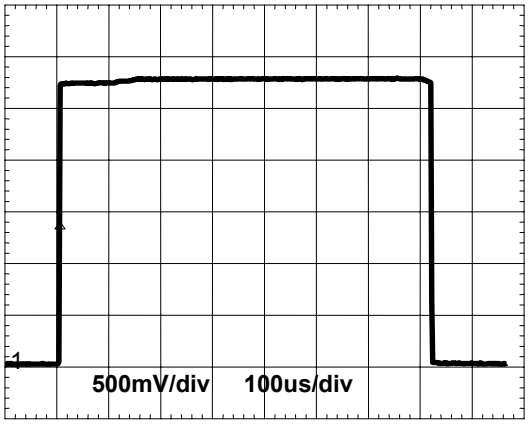
VPCTRL _900 power level high at R703/C703
VPCTRL_1800/1900 power level high at R704/C704_



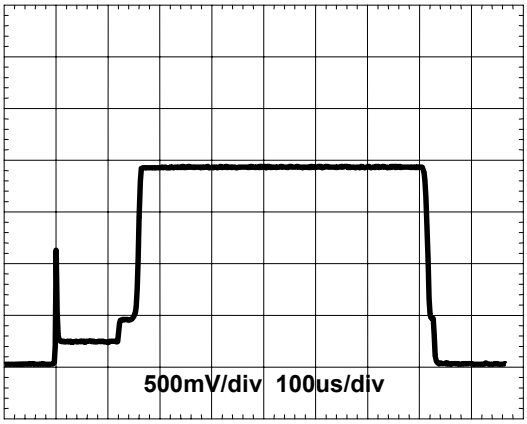
TX I/Q at R516/517 power level high Random data



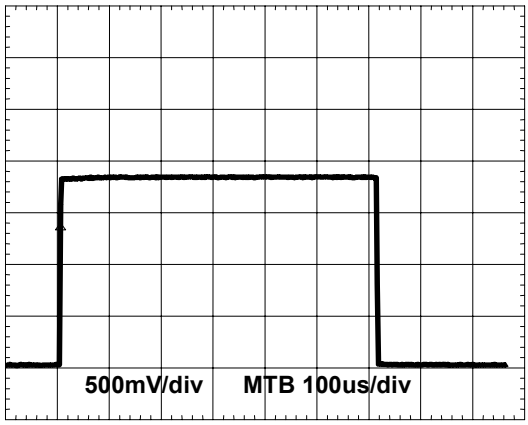
VANT_1 / EGSM900 TX at C804
VANT_2 / GSM1800 TX at C835
VANT_3 / GSM1900 TX at C805 0V
(no signal/ Flatline on Oscilloscope screen)



VANT_1,VANT_2,VANT_3



VTXB_900 at C713
VTXB_1800_1900 at C714



TXP at J504

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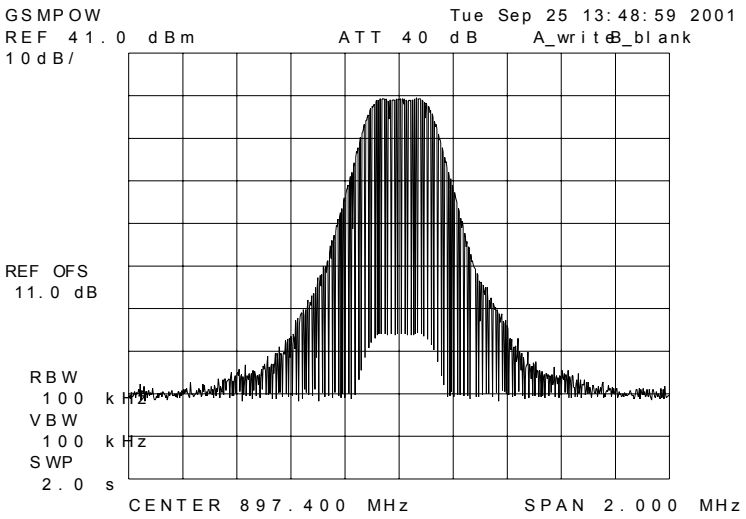
Figure 7: TX OUT signal



Tx out signal, 900 band, burst mode, channel 37

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EGSM900, GSM1800 and GSM1900 Receiver

General instructions for Rx troubleshooting

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply to module test jig with FLC-2 cable.

Set the DC supply voltage to 6V (test jig has internal voltage regulator of output voltage 4V).

Connect an RF-cable to the module test jig (MJS-49) RF connector and to RF signal generator.

Set the phone module to test jig and start Phoenix service sofware.

Initialize connection to phone. (use FBUS driver when using DAU9S and COMBOX driver when using FPS-8)

Choose product from the menu

File -> Choose product -> NPM-6

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Maintenance -> Testing -> RF Controls

From the RF controls window:

- Select band "EGSM900", "GSM 1800" or “GSM1900” (Default = "EGSM900")

- Set Active unit to "Rx" (Default = "Rx")

- Set Operation mode to "Burst" (Default = "Burst")

For continuous mode:

- Set Operation mode to "Continuous"

- Set AGC to "12: FEG_ON + DTOS_ON + BB_30=Vgain60” (maximum gain setting used in normal mode)

(Default = "14: FEG_ON + DTOS_ON + BB_42=Vgain72")

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- Set Rx/Tx channel to 37 on EGSM900 band, 700 on GSM1800 band or 661 on GSM1900 (Defaults)

Apply 942.46771 MHz (channel 37 + 67.710 kHz offset), 1842.86771 MHz (channel 700 + 67.710 kHz offset) or 1960.06771 MHz (channel 661 + 67.71 kHz) –90 dBm signal to the RF-connector (remember to compensate for cable attenuation).

Measuring with an oscilloscope on "RXI" or "RXQ" following screens should be seen on a working EGSM900 , GSM1800 or GSM1900 receiver:

Figure 8: RX I/Q signal ,burst mode, input level –90dBm.

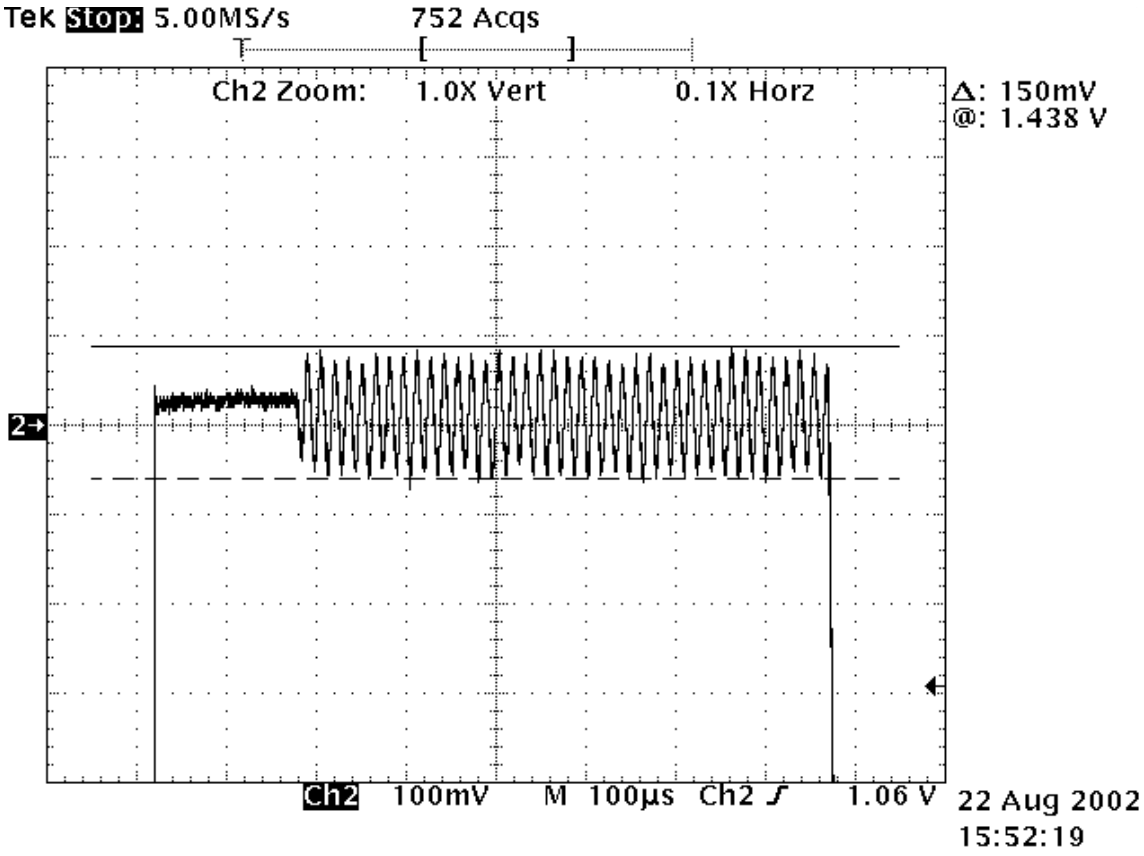

Figure 8, "RX I/Q signal ,burst mode, input level –90dBm.," on page 15: Receiver I or Q burst mode signal (channel 37) measured from testpoint RXI or RXQ with 942.467 MHz signal, input level –90dBm at RF-connector.

Correct signal amplitudes approximately:

- EGSM900~170mVpp
- GSM1800~140mVpp
- GSM1900~160mVpp

Signal part frequency 67.7kHz sine.

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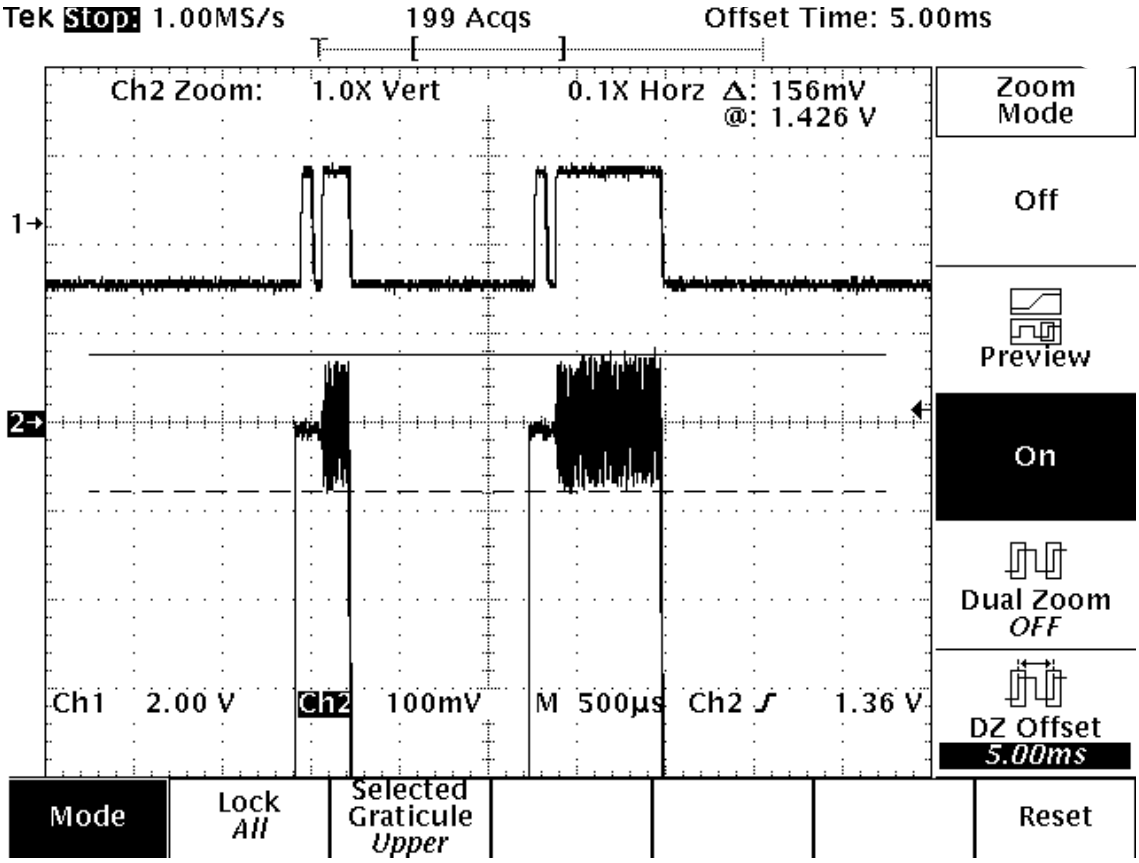
DC level of signal part is 1.35V. DC level can variate about +/-100mV between I and Q signals and between different bands as well.

Figure 9: GSM1900 RX I or Q signal (trace2), burst mode.



For GSM1900 receiver burst mode I or Q signal at ch 661 with input signal 1960.067MHz, level –90 dBm at RF-connector.

Trace2: With wider time scaling both monitoring and own RX bursts are seen, 1st burst (shorter) is monitoring and 2nd burst (longer) is own RX burst.

Trace1: External LNA VCC supply voltage at burst mode, input level –90 dBm. Measured from testpoint LNA_VCC.

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Figure 10: RX I&Q, phase difference 90 deg between signals.

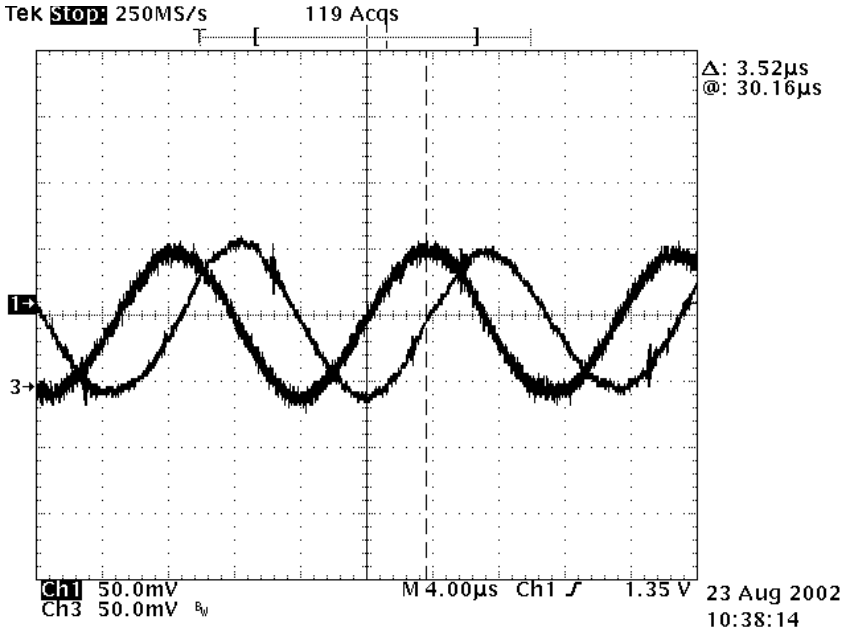

Figure 10, "RX I&Q, phase difference 90 deg between signals.," on page 17:

Detailed view of EGSM900 continuous mode RX I and Q signals measured from testpoints RXI and RXQ simultaneously.

Used channel 37, input signal 942.467 MHz, level –90 dBm at antenna port, AGC setting 12.

Phase difference should be 90 degrees between RX I and Q signals at all bands.

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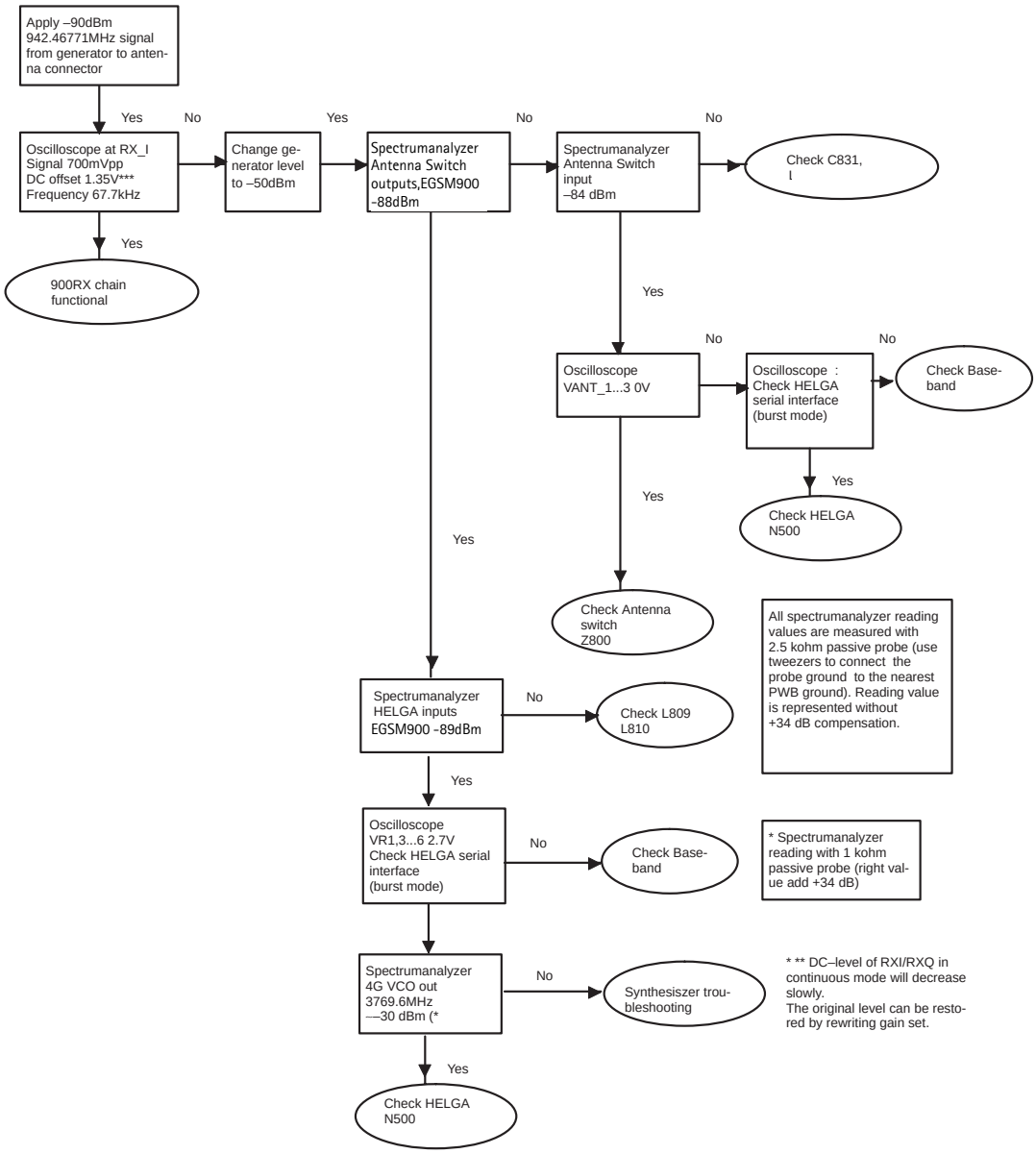
Troubleshooting diagram for EGSM900 receiver

Phone in "Continuous" mode, AGC setting "12"

Figure 11: EGSM900 receiver troubleshooting


Apply –90dBm 942.46771MHz signal from generator to antenna connector
Yes
No
Oscilloscope at RX_I Signal 700mVpp DC offset 1.35V*** Frequency 67.7kHz
Change generator level to –50dBm
Yes
Spectrumanalyzer Antenna Switch outputs,EGSM900 -88dBm
No
Spectrumanalyzer Antenna Switch input –84 dBm
No
Check C831, I
Yes
900RX chain functional
Yes
Oscilloscope VANT_1...3 0V
No
Oscilloscope : Check HELGA serial interface (burst mode)
No
Check Baseband
Yes
Check HELGA N500
Yes
Check Antenna switch Z800
Yes
Spectrumanalyzer HELGA inputs EGSM900 -89dBm
No
Check L809 L810
Yes
Oscilloscope VR1,3...6 2.7V Check HELGA serial interface (burst mode)
No
Check Baseband
Spectrumanalyzer 4G VCO out 3769.6MHz —30 dBm (*
No
Synthesiszer troubleshooting
Yes
Check HELGA N500
All spectrumanalyzer reading values are measured with 2.5 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +34 dB compensation.
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +34 dB)
* ** DC–level of RXI/RXQ in continuous mode will decrease slowly.
The original level can be restored by rewriting gain set.

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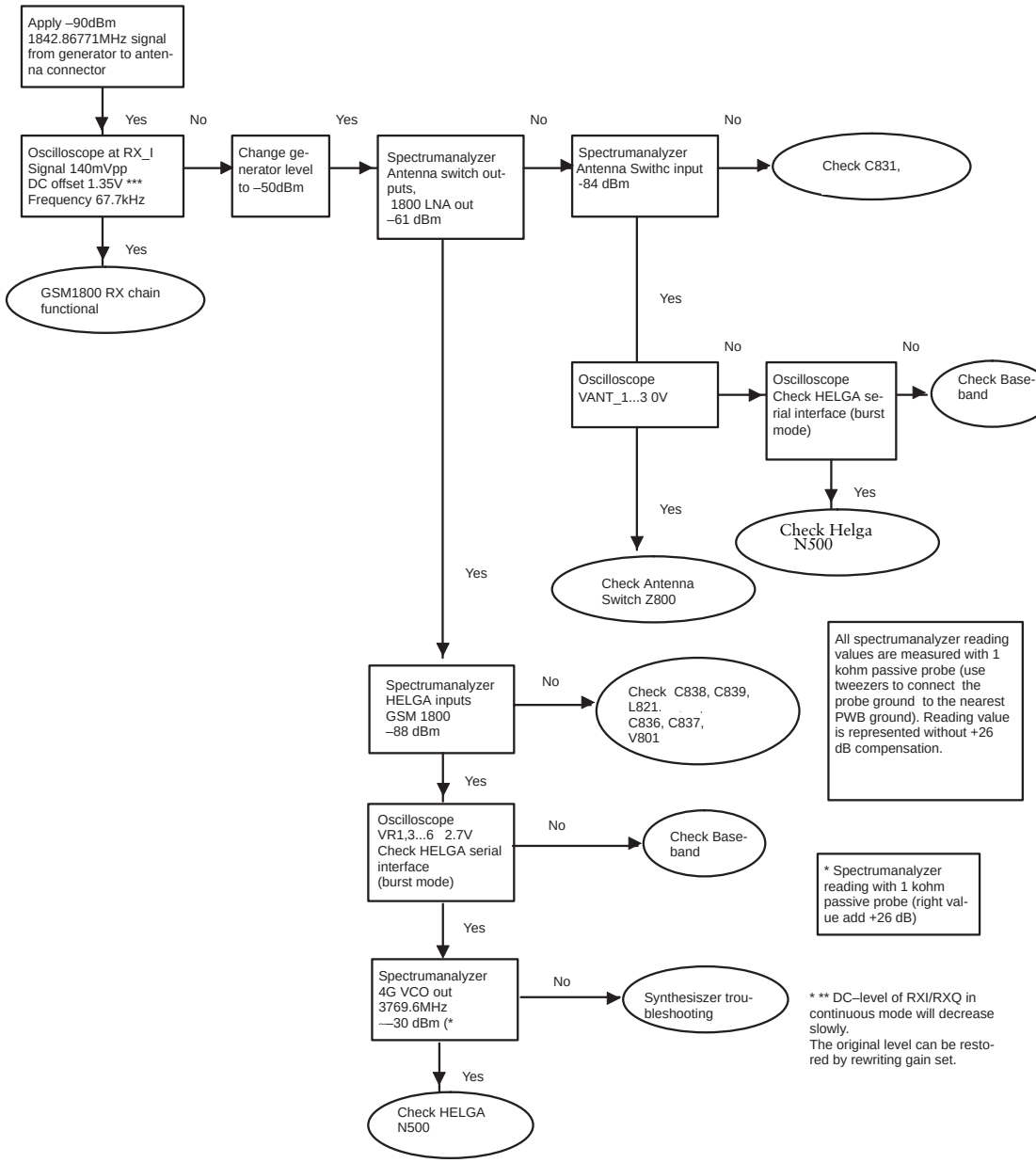
Troubleshooting diagram for GSM1800 receiver

Phone in "Continuous" mode, AGC setting "12

Figure 12: GSM1800 receiver troubleshooting


Apply –90dBm 1842.86771MHz signal from generator to antenna connector
Yes
No
Oscilloscope at RX_I Signal 140mVpp DC offset 1.35V *** Frequency 67.7kHz
Change generator level to –50dBm
Yes
Spectrumanalyzer Antenna switch outputs, 1800 LNA out –61 dBm
No
Spectrumanalyzer Antenna Swithc input -84 dBm
No
Check C831,
Yes
GSM1800 RX chain functional
Yes
Oscilloscope VANT_1...3 0V
No
Oscilloscope Check HELGA serial interface (burst mode)
No
Check Baseband
Yes
Check Helga N500
Yes
Check Antenna Switch Z800
Yes
Spectrumanalyzer HELGA inputs GSM 1800 –88 dBm
No
Check C838, C839, L821. C836, C837, V801
Yes
Oscilloscope VR1,3...6 2.7V Check HELGA serial interface (burst mode)
No
Check Baseband
Yes
Spectrumanalyzer 4G VCO out 3769.6MHz —30 dBm (*
No
Synthesiszer troubleshooting
Yes
Check HELGA N500
All spectrumanalyzer reading values are measured with 1 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +26 dB compensation.
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +26 dB)
* ** DC–level of RXI/RXQ in continuous mode will decrease slowly.
The original level can be restored by rewriting gain set.

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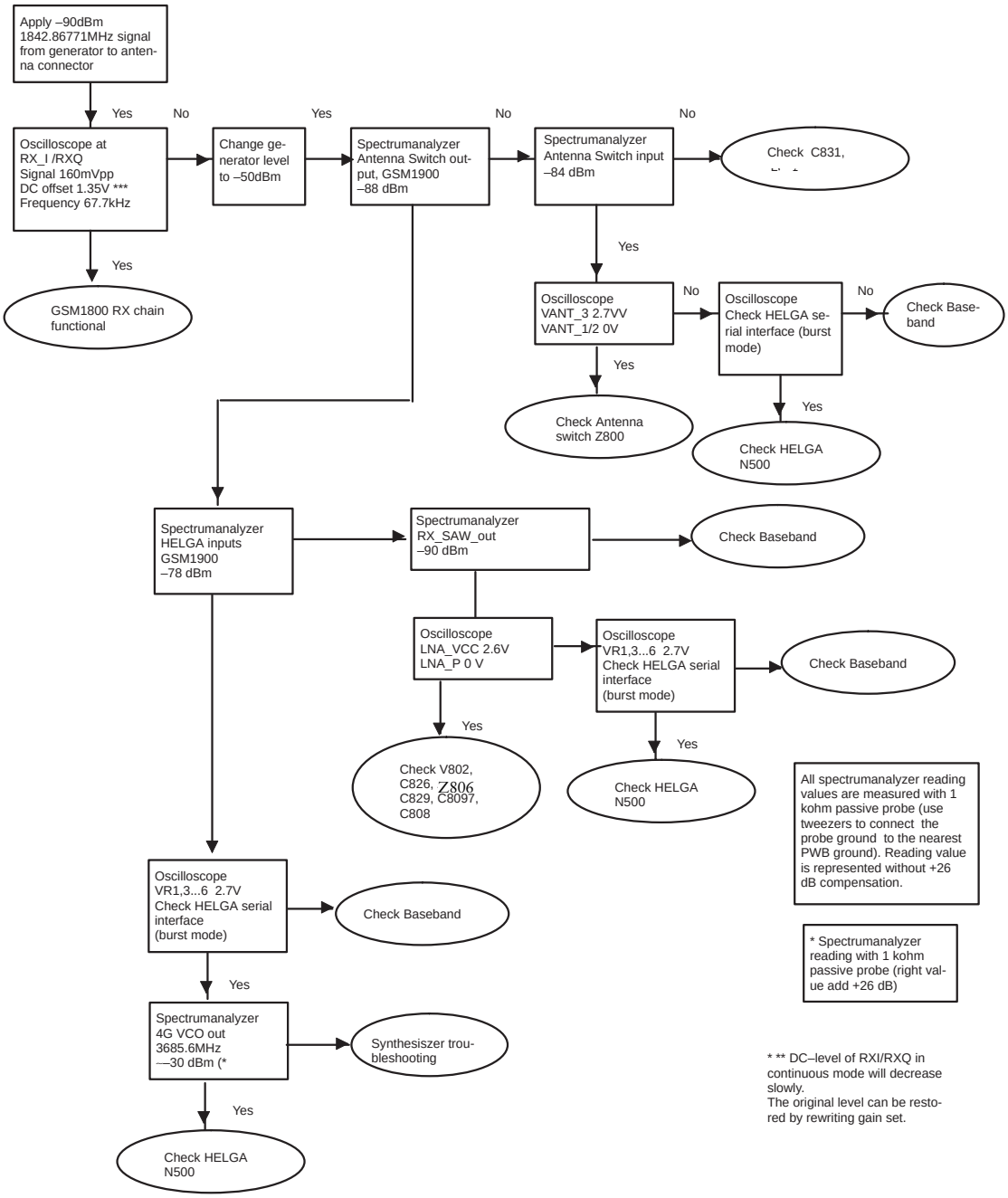
Troubleshooting diagram for GSM1900 receiver

Phone in "Continuous" mode, AGC setting "12

Figure 13: GSM1900 receiver troubleshooting


Apply –90dBm 1842.86771MHz signal from generator to antenna connector
Yes
No
Oscilloscope at RX_I /RXQ Signal 160mVpp DC offset 1.35V *** Frequency 67.7kHz
Change generator level to –50dBm
Yes
No
Spectrumanalyzer Antenna Switch output, GSM1900 –88 dBm
No
Spectrumanalyzer Antenna Switch input –84 dBm
Check C831,
Yes
GSM1800 RX chain functional
Yes
Oscilloscope VANT_3 2.7VV VANT_1/2 0V
No
Oscilloscope Check HELGA serial interface (burst mode)
No
Check Baseband
Yes
Check Antenna switch Z800
Yes
Check HELGA N500
Spectrumanalyzer HELGA inputs GSM1900 –78 dBm
Spectrumanalyzer RX_SAW_out –90 dBm
Check Baseband
Oscilloscope LNA_VCC 2.6V LNA_P 0 V
Oscilloscope VR1,3...6 2.7V Check HELGA serial interface (burst mode)
Check Baseband
Yes
Check V802, C826, Z806 C829, C8097, C808
Yes
Check HELGA N500
All spectrumanalyzer reading values are measured with 1 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +26 dB compensation.
Oscilloscope VR1,3...6 2.7V Check HELGA serial interface (burst mode)
Check Baseband
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +26 dB)
Yes
Spectrumanalyzer 4G VCO out 3685.6MHz —30 dBm (*
Synthesiszer troubleshooting
* ** DC–level of RXI/RXQ in continuous mode will decrease slowly.
The original level can be restored by rewriting gain set.
Yes
Check HELGA N500

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Synthesizer

General instructions for synthesizer troubleshooting

Connect test jig to computer with DAU9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply or FPS-8 to module test jig with PCS-1 cable.

Set the DC supply voltage to 3.9V and set the jumper connector on test jig to "bypass" position.

Set the phone module to test jig and start Phoenix service sofware

Initialize connection to phone. (use FBUS driver when using DAU9S and COMBOX driver when using FPS-8)

Select product from the menu

File -> Choose product -> NPM-6

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Maintenance -> Testing -> RF Controls

From the RF controls window

- Select band "EGSM900", "GSM 1800" or "GSM1900" (Default = "EGSM900")

- Set Active unit to "Rx" (Default = "Rx")

- Set Operation mode to "Continuous" (Default = "Burst")

- Set Rx/Tx channel to 37 on EGSM900 band, 700 on GSM1800 band, 661 on GSM1900 band (Defaults)

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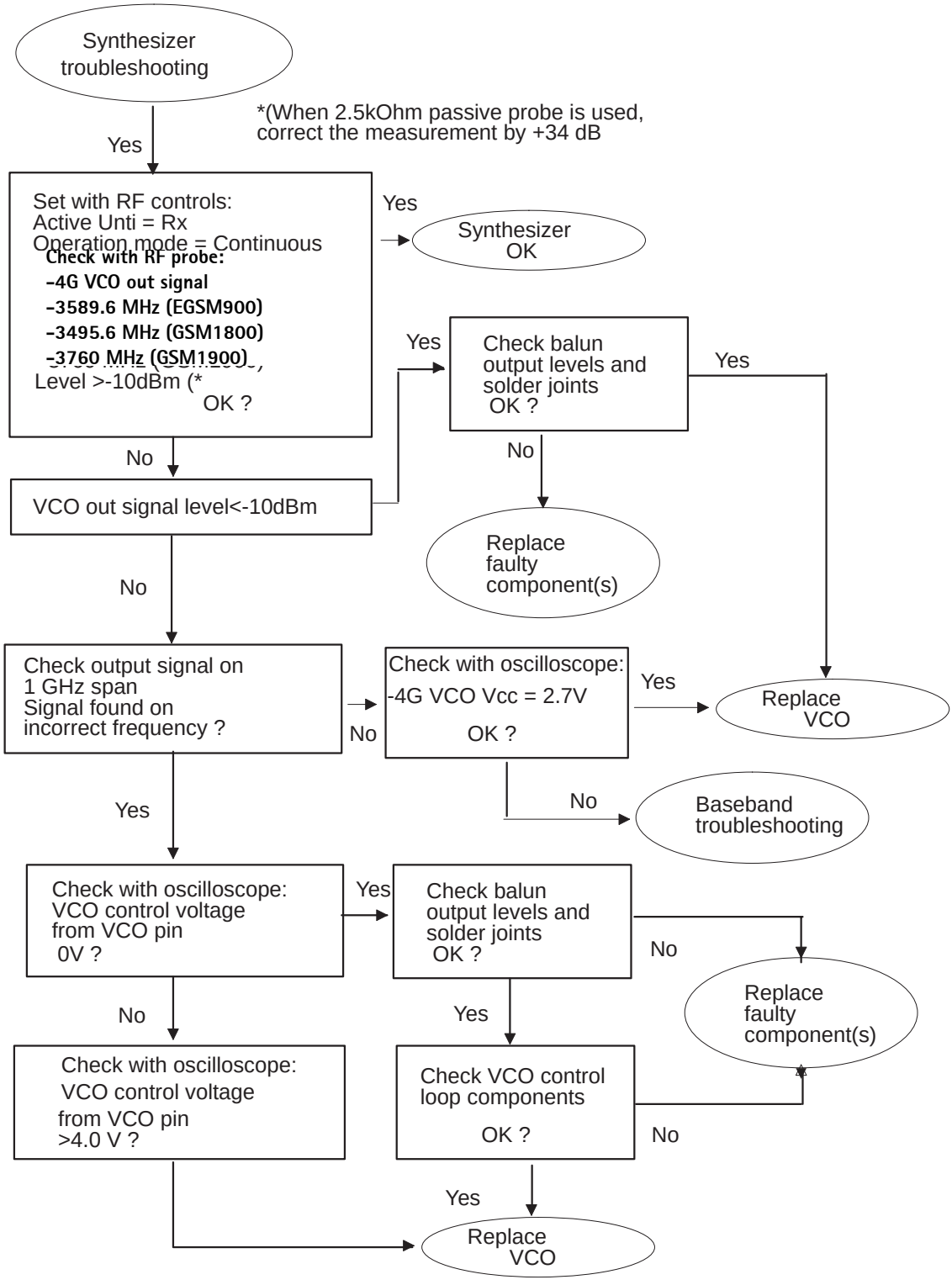
Synthesizer troubleshooting diagram

Figure 14:



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Pictures of synthesizer signals

Figure 15: 26MHz at G501 pin out

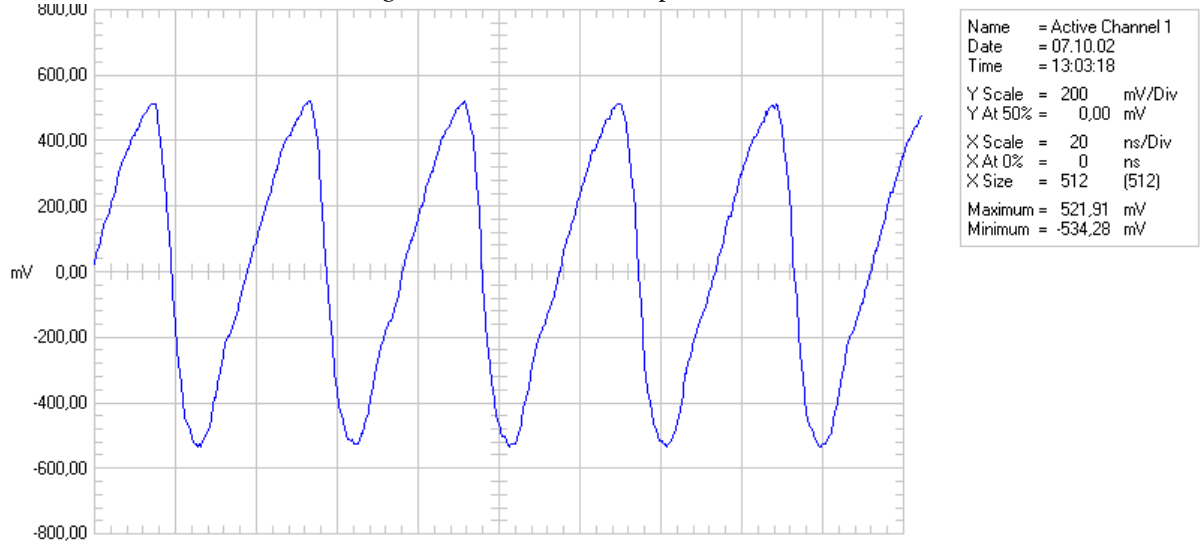

Figure 16: 26MHz RFCLK at R420/C420

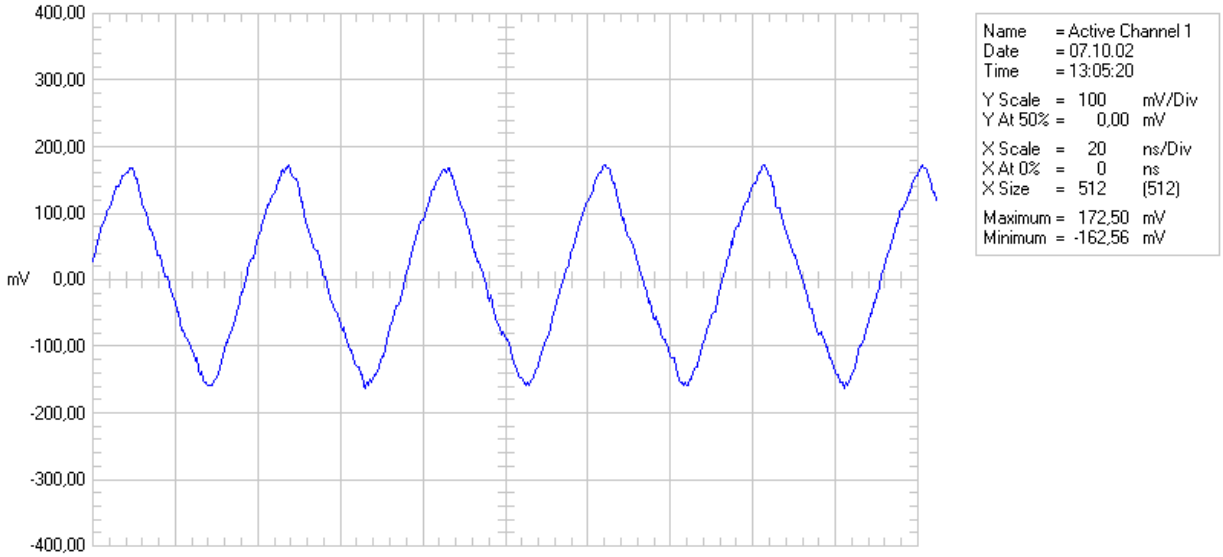

Figure 17: 1800 TX, channel 512, burst mode

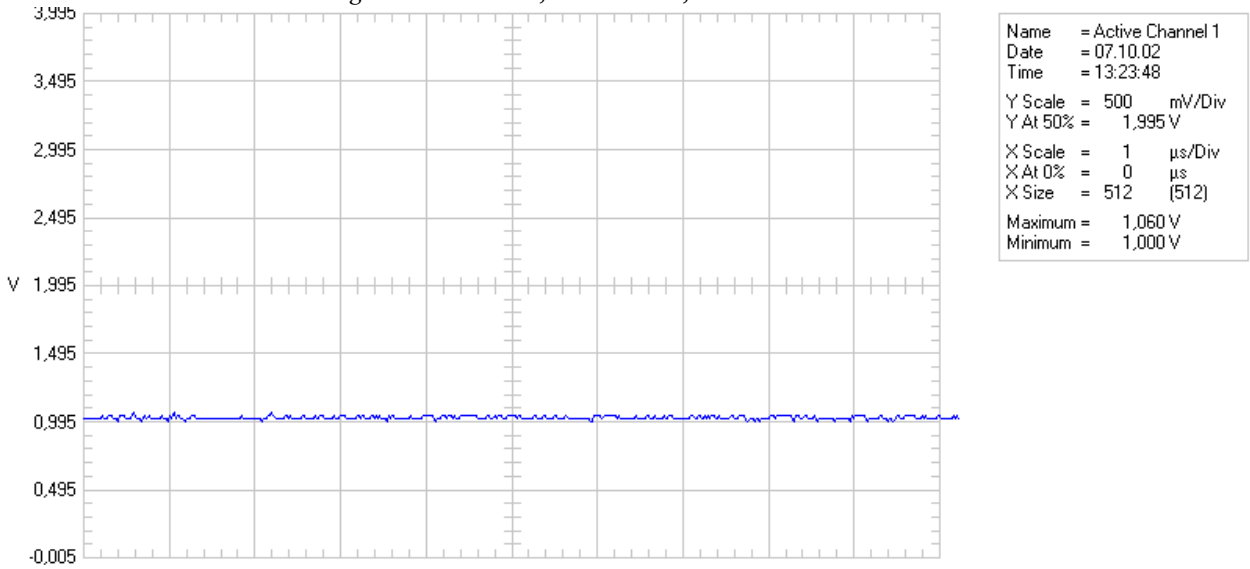

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Figure 18: 1900 RX, channel 810, continuous mode

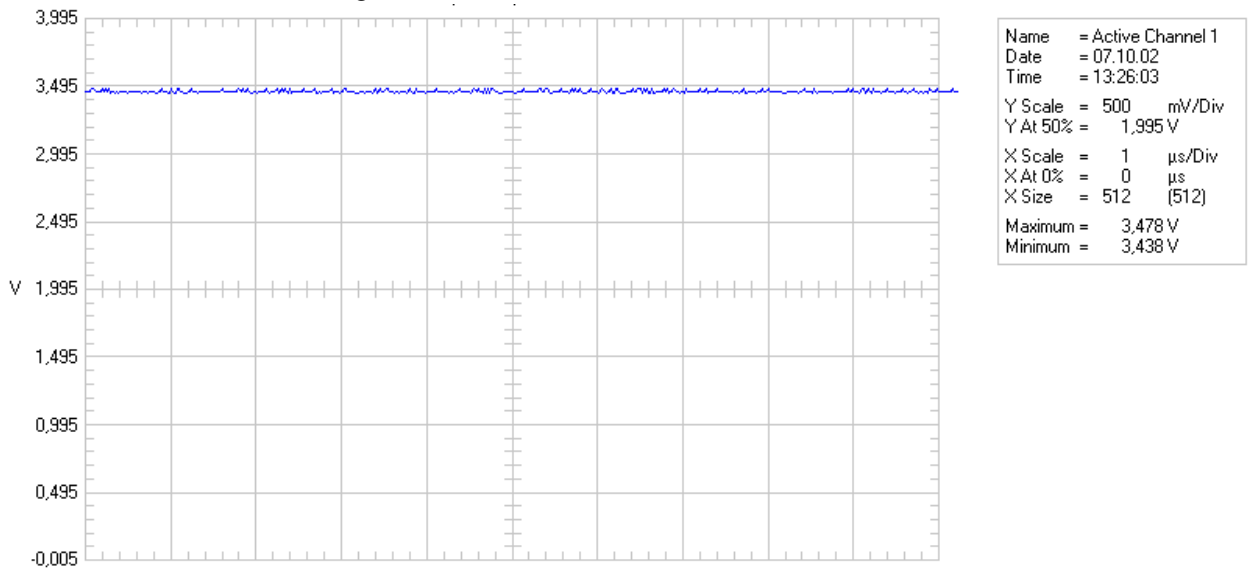
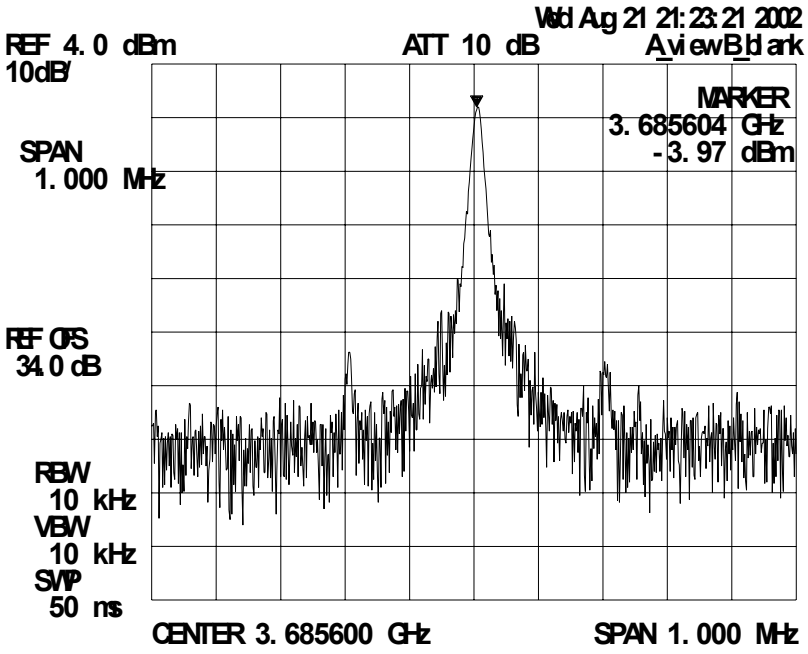


Figure 19: VCO output, 1800 band, RX on, continuous output



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Baseband Troubleshooting

BB Measurement points

Figure 20: NPM-6 BB Measurement points, Top

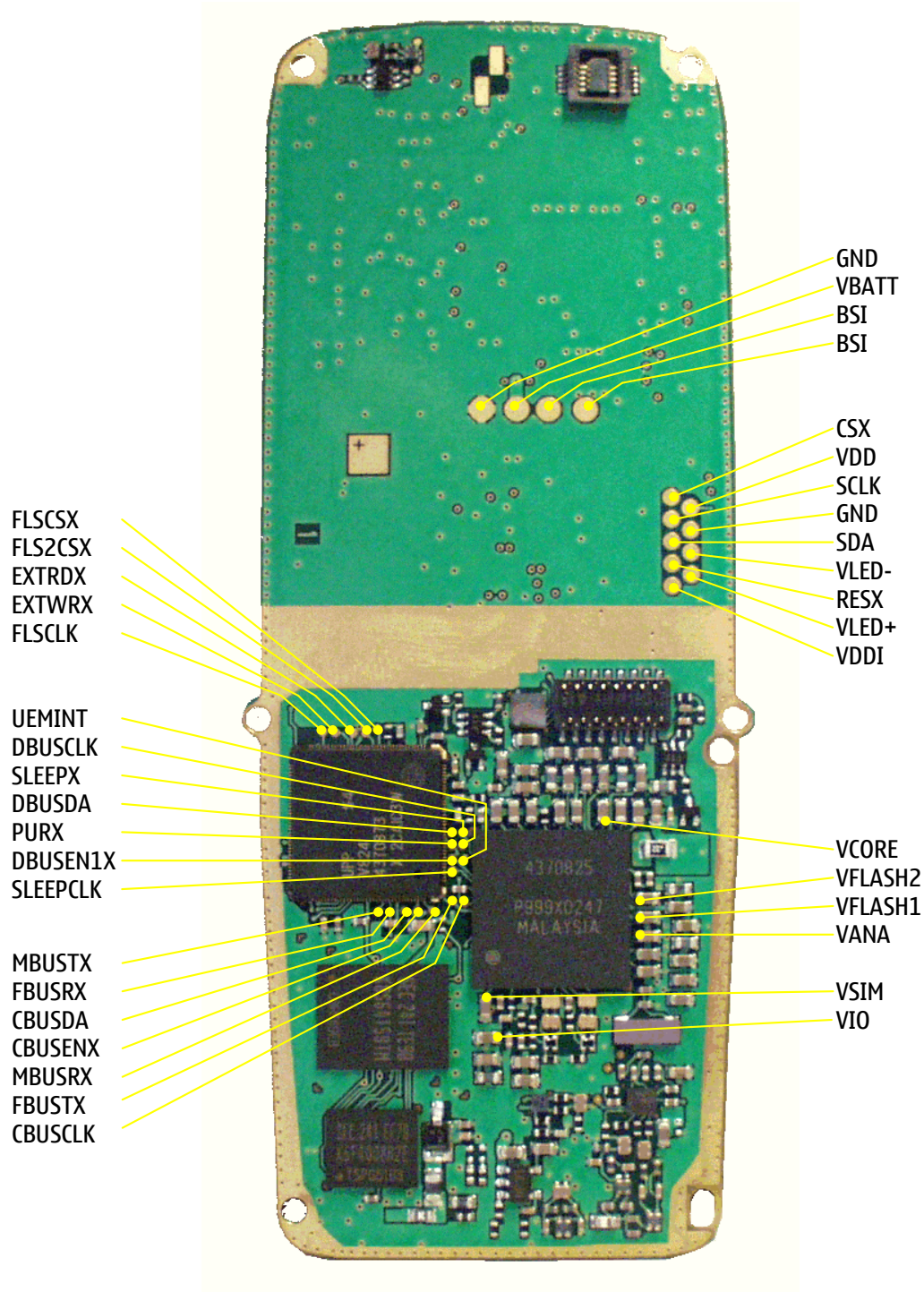

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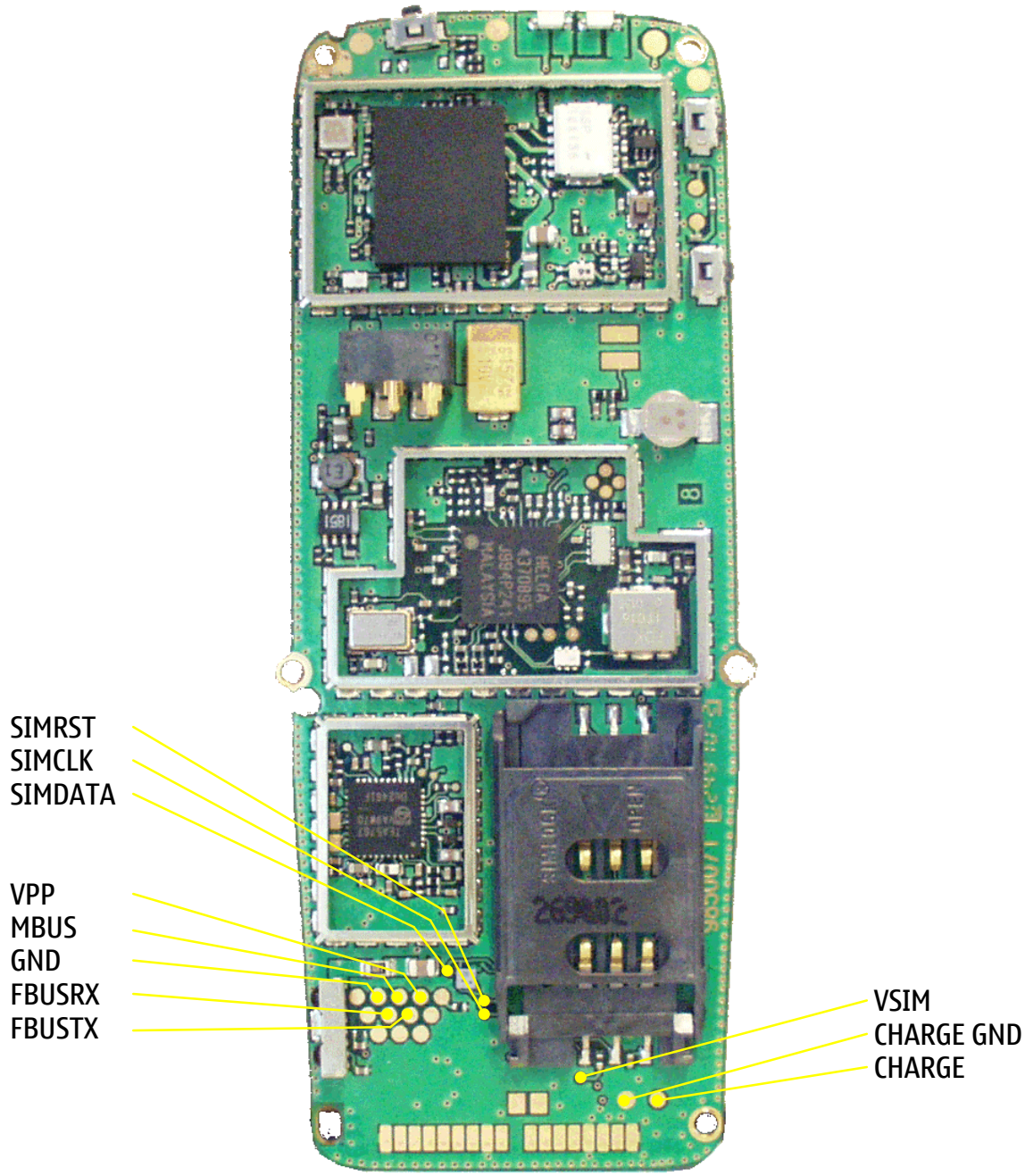
Figure 21: NPM-6 BB Measurement points, Bottom



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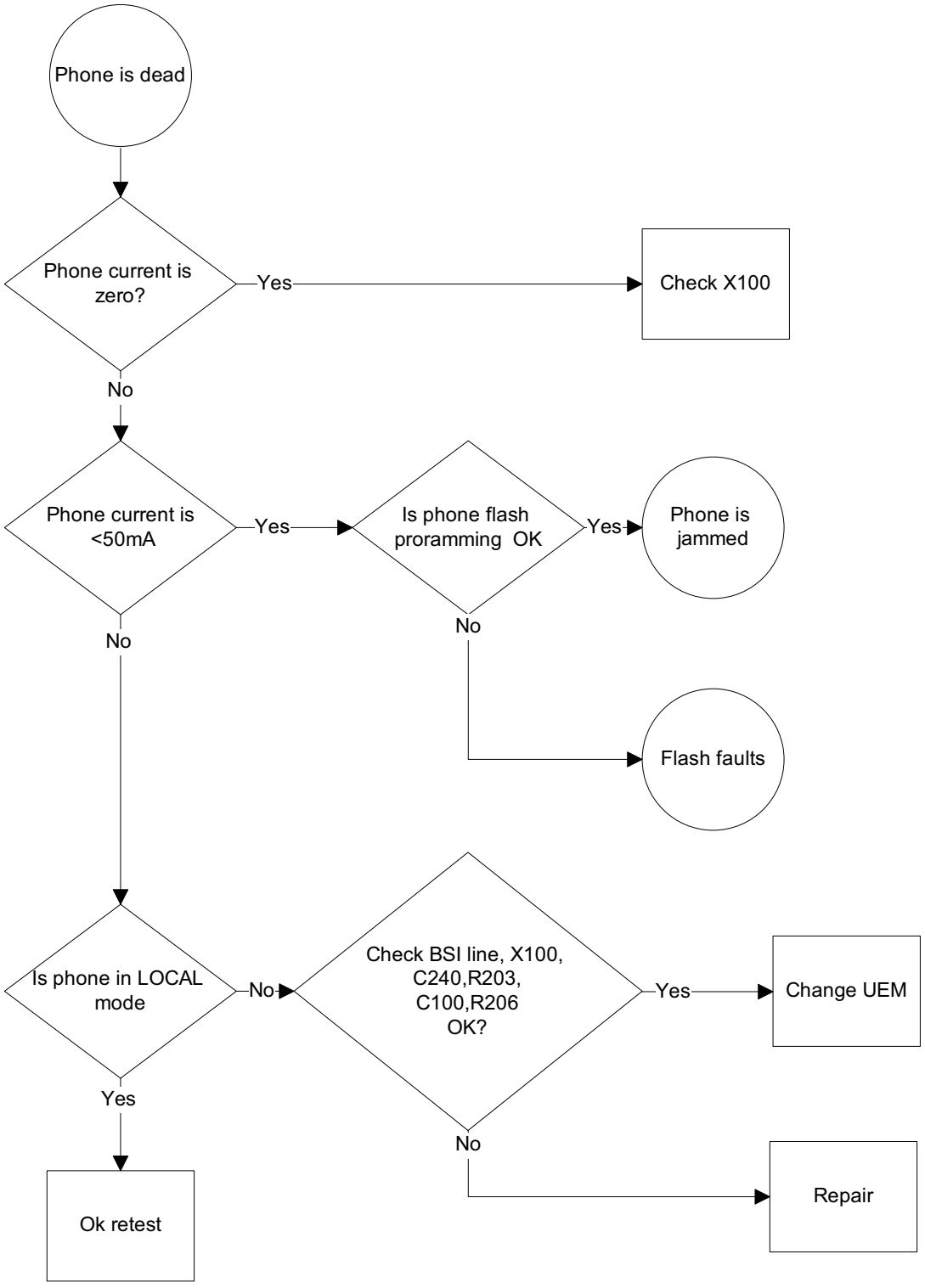
Troubleshooting diagrams

The following diagrams describe baseband troubleshooting.



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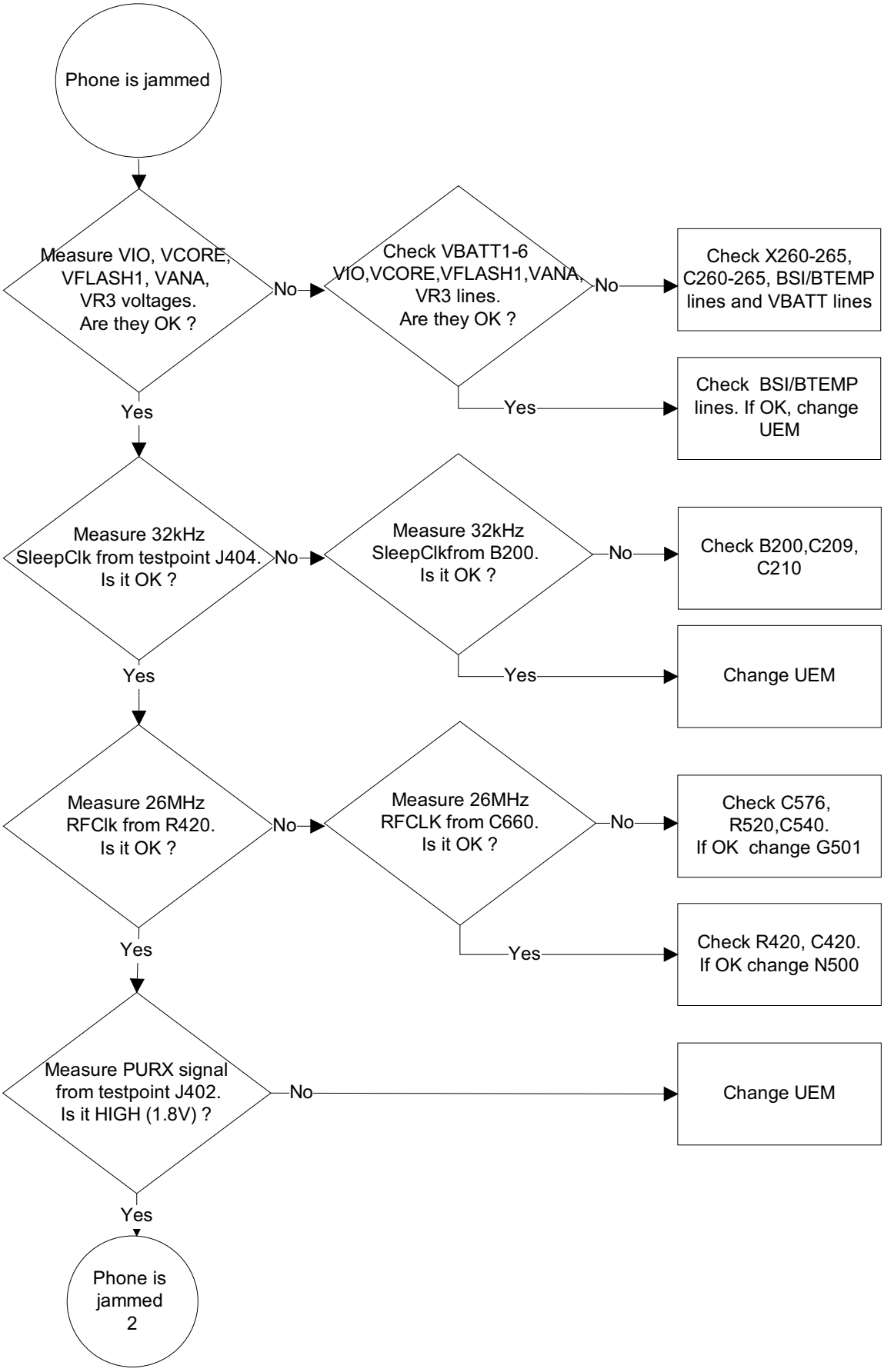
Phone is jammed
Measure VIO, VCORE, VFLASH1, VANA, VR3 voltages. Are they OK ?
No
Check VBATT1-6 VIO,VCORE,VFLASH1,VANA, VR3 lines. Are they OK ?
No
Check X260-265, C260-265, BSI/BTEMP lines and VBATT lines
Yes
Check BSI/BTEMP lines. If OK, change UEM
Yes
Measure 32kHz SleepClk from testpoint J404. Is it OK ?
No
Measure 32kHz SleepClkfrom B200. Is it OK ?
No
Check B200,C209, C210
Yes
Change UEM
Yes
Measure 26MHz RFClk from R420. Is it OK ?
No
Measure 26MHz RFCLK from C660. Is it OK ?
No
Check C576, R520,C540. If OK change G501
Yes
Check R420, C420. If OK change N500
Yes
Measure PURX signal from testpoint J402. Is it HIGH (1.8V) ?
No
Change UEM
Yes
Phone is jammed 2

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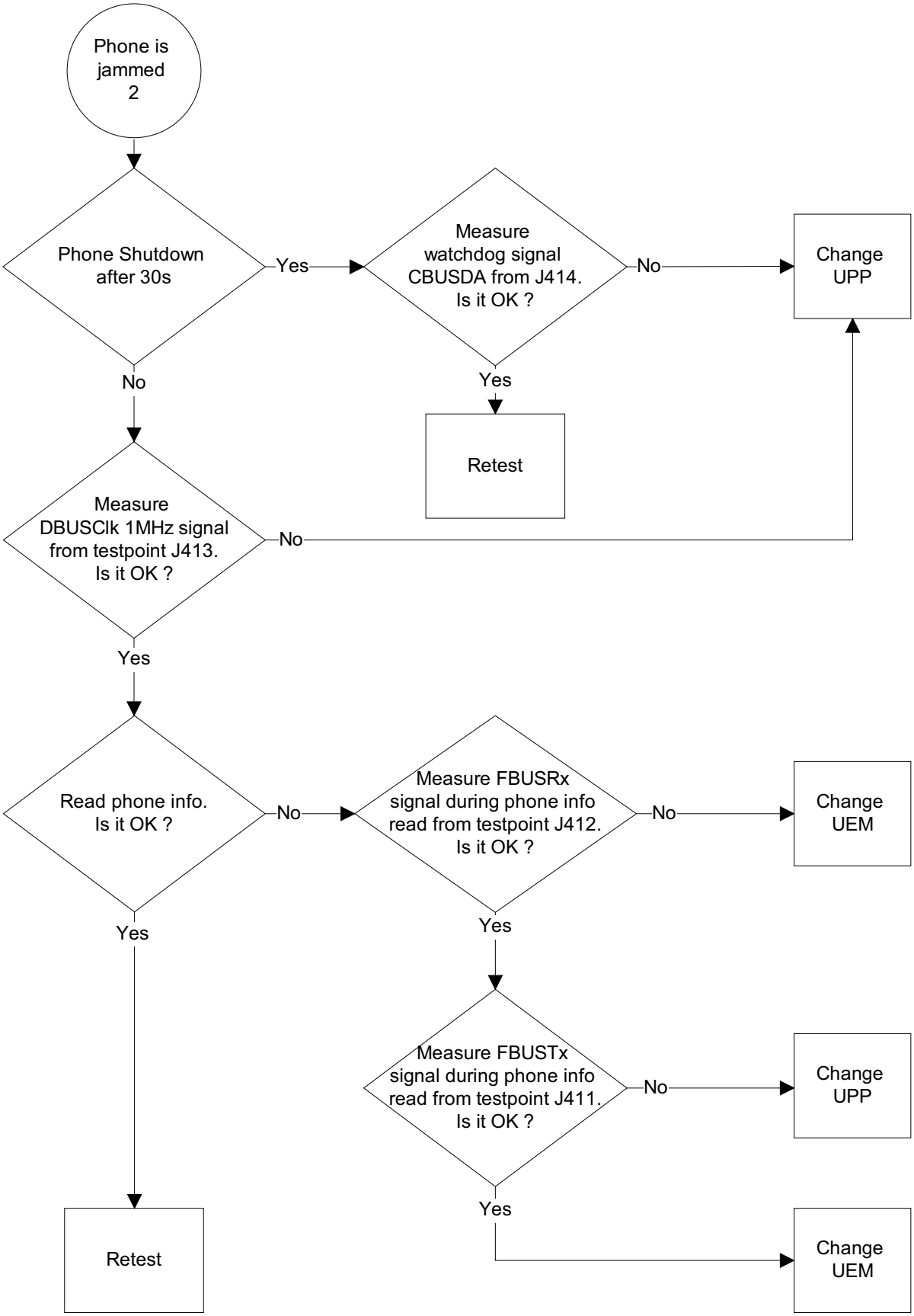

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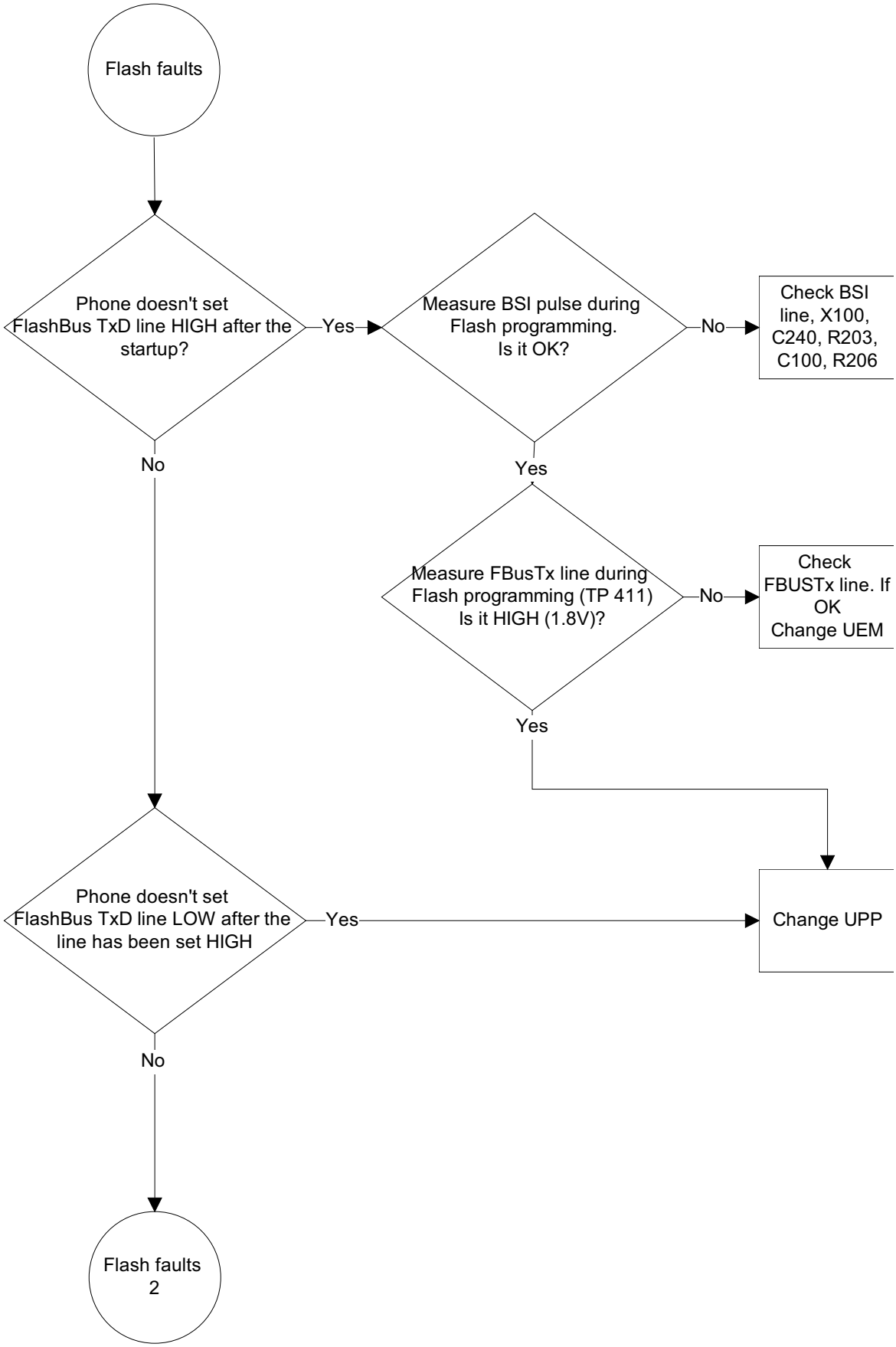
Flash faults
Phone doesn't set FlashBus TxD line HIGH after the startup?
Yes
Measure BSI pulse during Flash programming. Is it OK?
No
Check BSI line, X100, C240, R203, C100, R206
No
Yes
Measure FBusTx line during Flash programming (TP 411) Is it HIGH (1.8V)?
No
Check FBUSTx line. If OK Change UEM
Yes
Phone doesn't set FlashBus TxD line LOW after the line has been set HIGH
Yes
Change UPP
No
Flash faults 2

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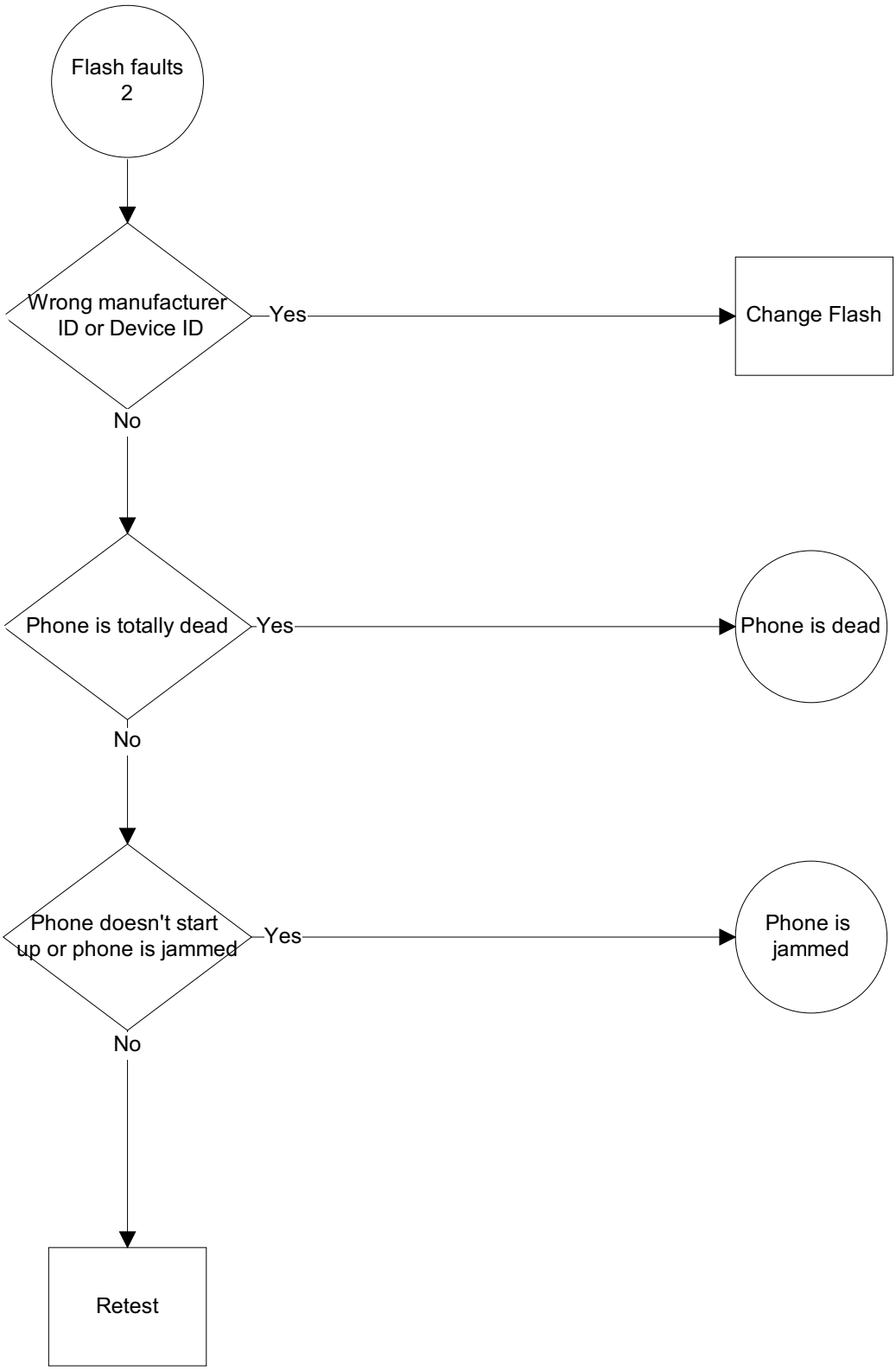

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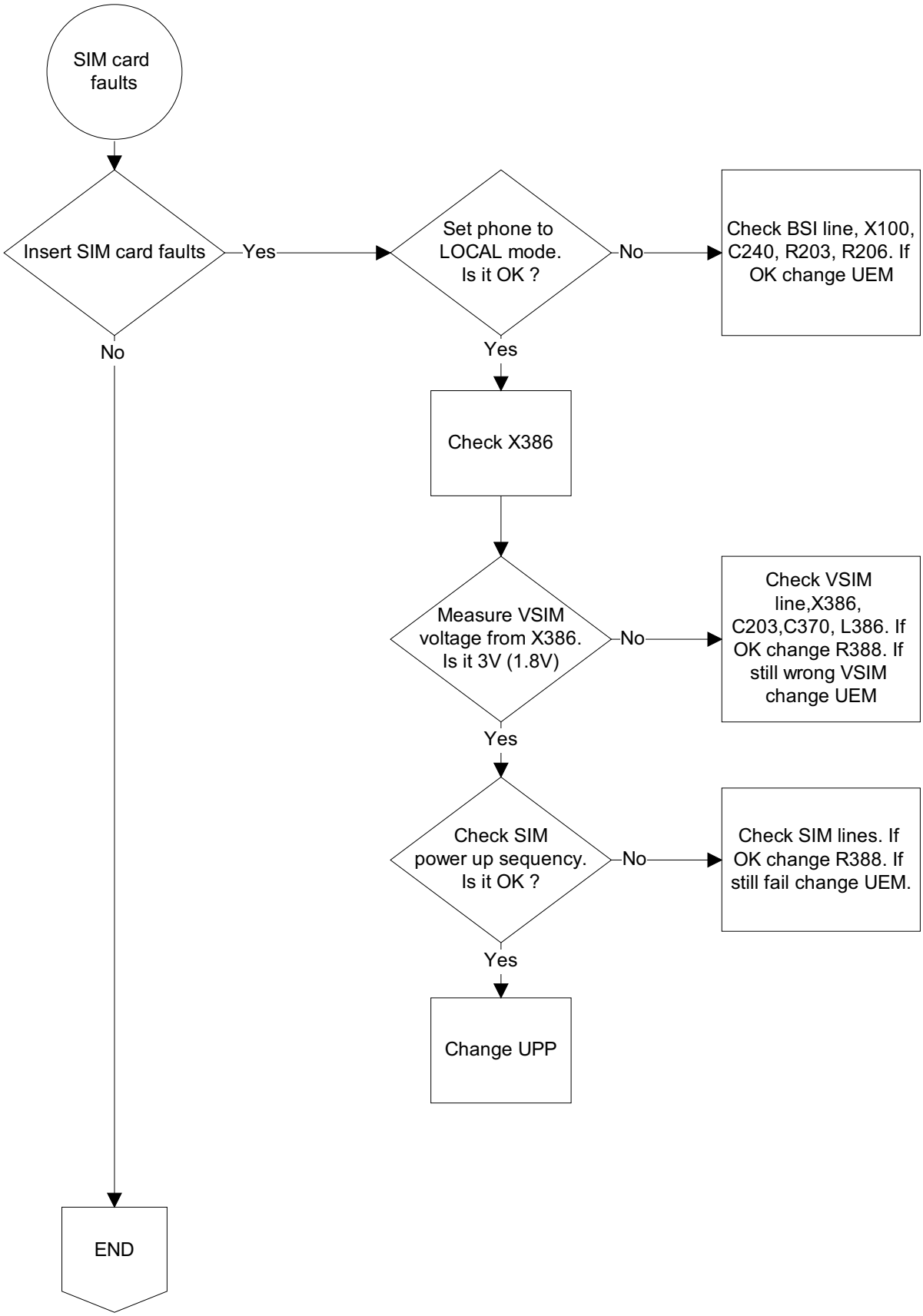
SIM card faults
Insert SIM card faults
Yes
No
Set phone to LOCAL mode. Is it OK ?
No
Check BSI line, X100, C240, R203, R206. If OK change UEM
Yes
Check X386
Measure VSIM voltage from X386. Is it 3V (1.8V)
No
Check VSIM line,X386, C203,C370, L386. If OK change R388. If still wrong VSIM change UEM
Yes
Check SIM power up sequency. Is it OK ?
No
Check SIM lines. If OK change R388. If still fail change UEM.
Yes
Change UPP
END

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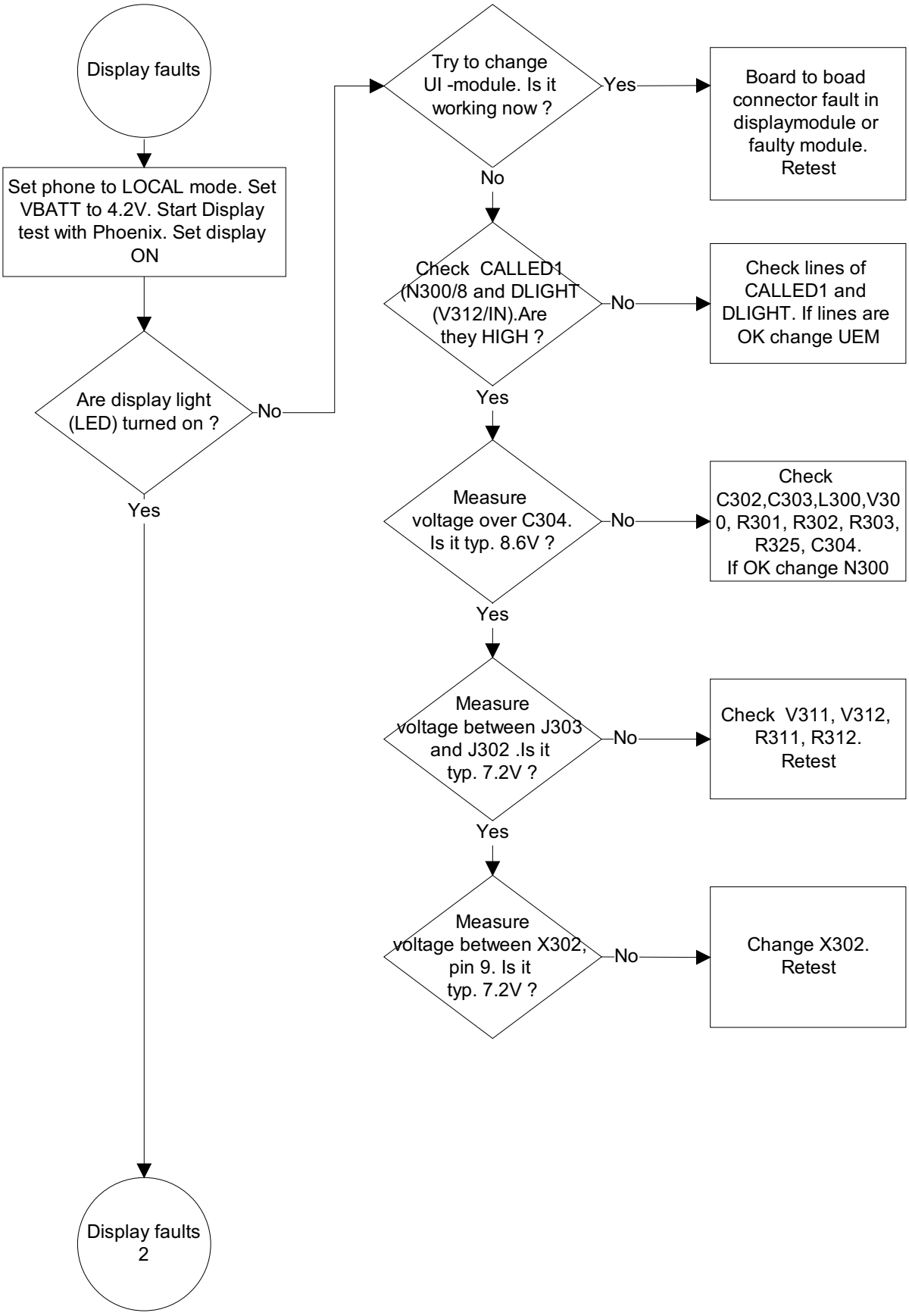
Display faults
Set phone to LOCAL mode. Set VBATT to 4.2V. Start Display test with Phoenix. Set display ON
Are display light (LED) turned on ?
No
Yes
Try to change UI -module. Is it working now ?
Yes
Board to boad connector fault in displaymodule or faulty module. Retest
No
Check CALLED1 (N300/8 and DLIGHT (V312/IN).Are they HIGH ?
No
Check lines of CALLED1 and DLIGHT. If lines are OK change UEM
Yes
Measure voltage over C304. Is it typ. 8.6V ?
No
Check C302,C303,L300,V300, R301, R302, R303, R325, C304. If OK change N300
Yes
Measure voltage between J303 and J302 .Is it typ. 7.2V ?
No
Check V311, V312, R311, R312. Retest
Yes
Measure voltage between X302, pin 9. Is it typ. 7.2V ?
No
Change X302. Retest
Display faults 2

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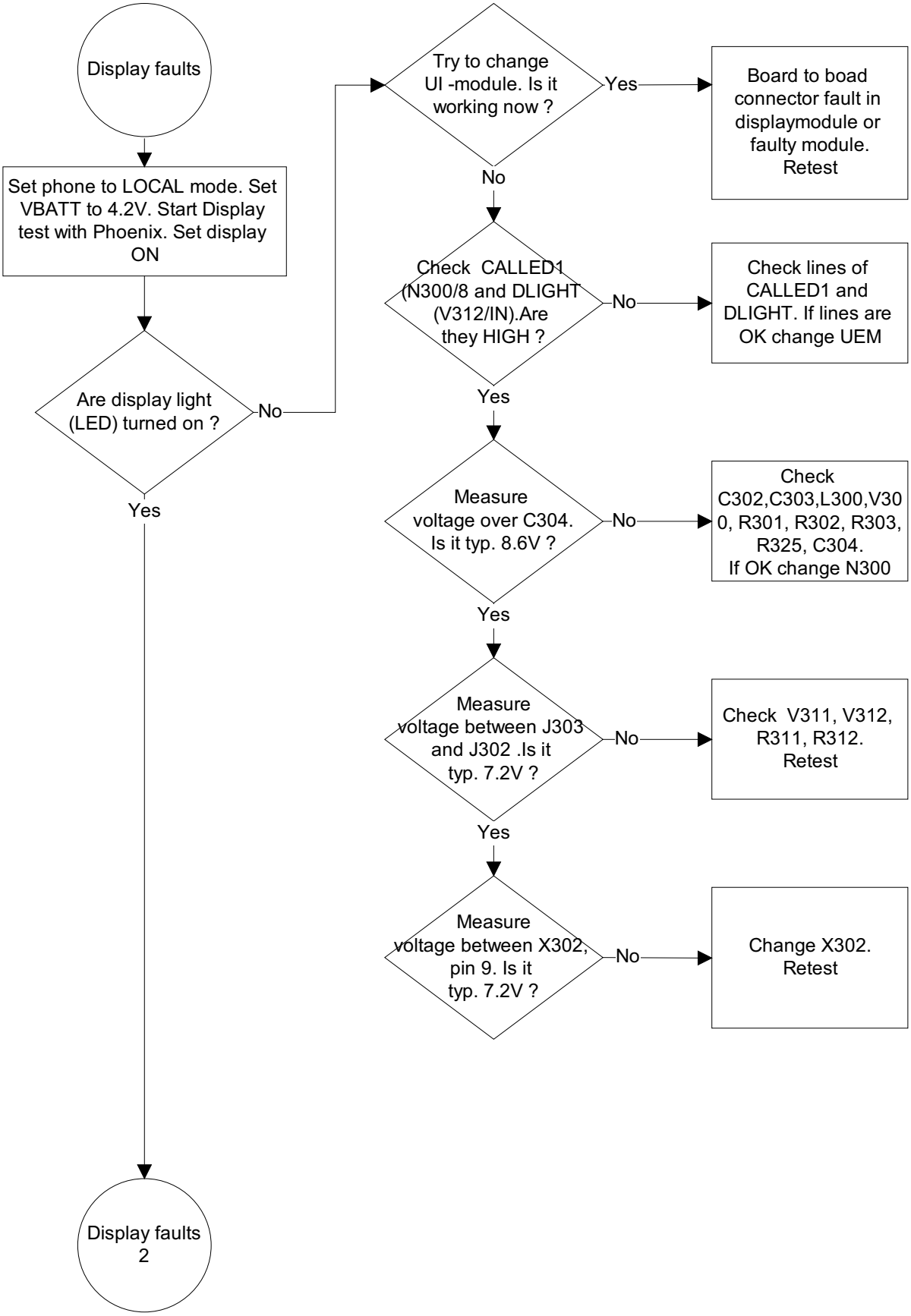
Display faults
Set phone to LOCAL mode. Set VBATT to 4.2V. Start Display test with Phoenix. Set display ON
Are display light (LED) turned on ?
No
Yes
Try to change UI -module. Is it working now ?
Yes
Board to boad connector fault in displaymodule or faulty module. Retest
No
Check CALLED1 (N300/8 and DLIGHT (V312/IN).Are they HIGH ?
No
Check lines of CALLED1 and DLIGHT. If lines are OK change UEM
Yes
Measure voltage over C304. Is it typ. 8.6V ?
No
Check C302,C303,L300,V300, R301, R302, R303, R325, C304. If OK change N300
Yes
Measure voltage between J303 and J302 .Is it typ. 7.2V ?
No
Check V311, V312, R311, R312. Retest
Yes
Measure voltage between X302, pin 9. Is it typ. 7.2V ?
No
Change X302. Retest
Display faults 2

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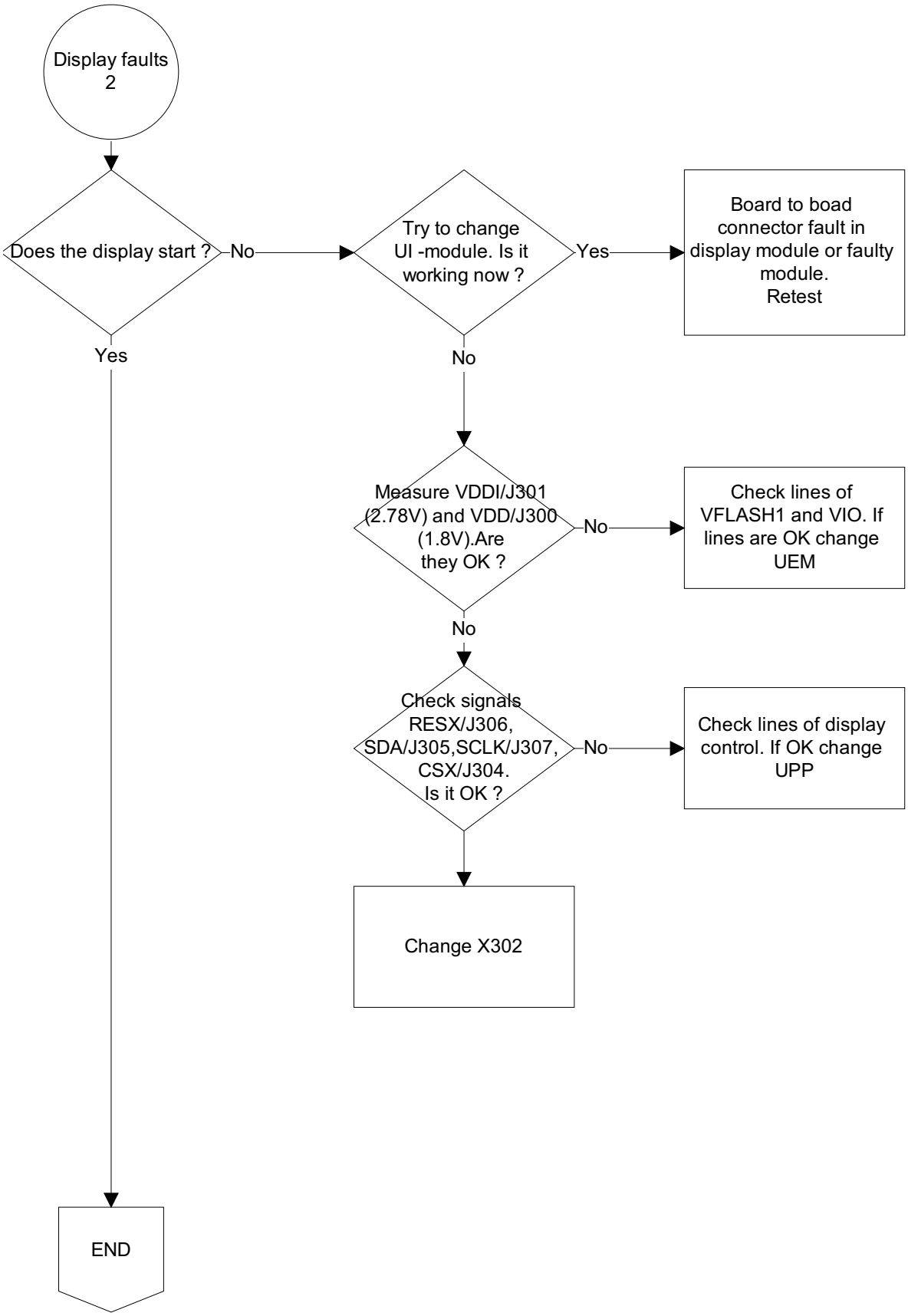
Display faults 2
Does the display start ?
No
Try to change UI -module. Is it working now ?
Yes
Board to boad connector fault in display module or faulty module. Retest
Yes
No
Measure VDDI/J301 (2.78V) and VDD/J300 (1.8V).Are they OK ?
No
Check lines of VFLASH1 and VIO. If lines are OK change UEM
No
Check signals RESX/J306, SDA/J305,SCLK/J307, CSX/J304. Is it OK ?
No
Check lines of display control. If OK change UPP
Change X302
END

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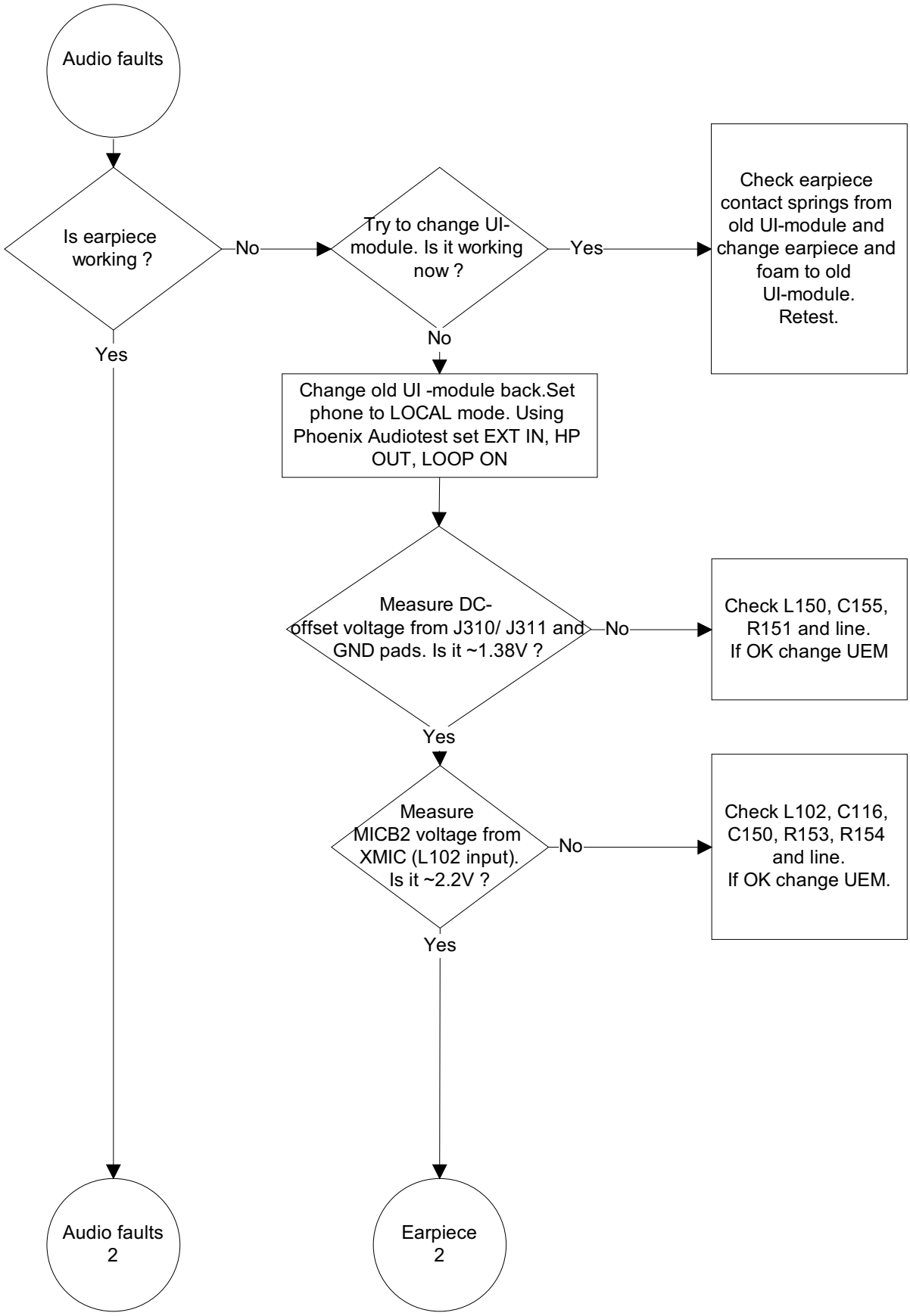
Audio faults
Is earpiece working ?
No
Try to change UI-module. Is it working now ?
Yes
Check earpiece contact springs from old UI-module and change earpiece and foam to old UI-module. Retest.
No
Yes
Change old UI -module back.Set phone to LOCAL mode. Using Phoenix Audiotest set EXT IN, HP OUT, LOOP ON
Measure DC-offset voltage from J310/ J311 and GND pads. Is it ~1.38V ?
No
Check L150, C155, R151 and line. If OK change UEM
Yes
Measure MICB2 voltage from XMIC (L102 input). Is it ~2.2V ?
No
Check L102, C116, C150, R153, R154 and line. If OK change UEM.
Yes
Audio faults 2
Earpiece 2

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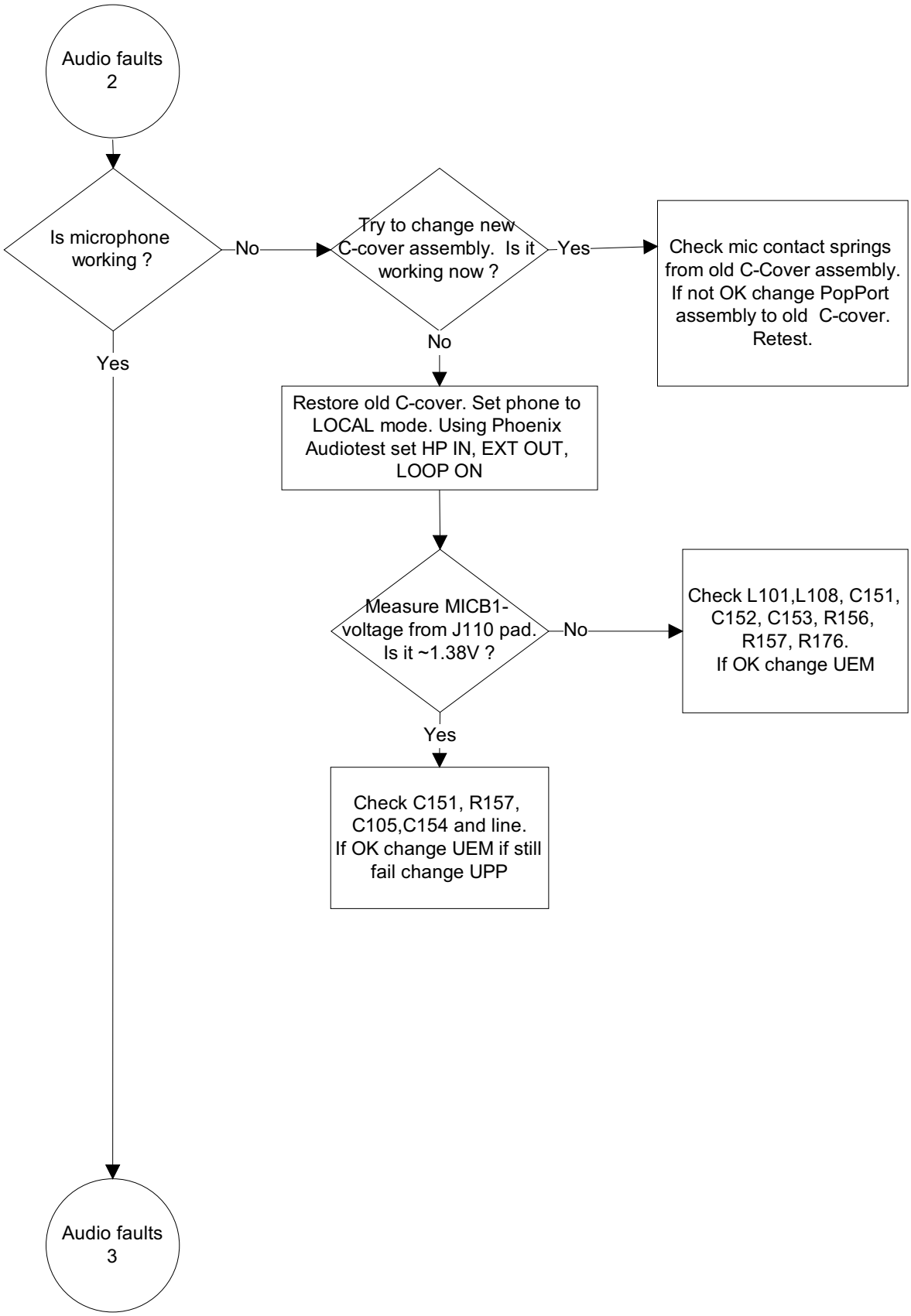
Audio faults 2
Is microphone working ?
No
Try to change new C-cover assembly. Is it working now ?
Yes
Check mic contact springs from old C-Cover assembly. If not OK change PopPort assembly to old C-cover. Retest.
No
Yes
Restore old C-cover. Set phone to LOCAL mode. Using Phoenix Audiotest set HP IN, EXT OUT, LOOP ON
Measure MICB1-voltage from J110 pad. Is it ~1.38V ?
No
Check L101,L108, C151, C152, C153, R156, R157, R176. If OK change UEM
Yes
Check C151, R157, C105,C154 and line. If OK change UEM if still fail change UPP
Audio faults 3

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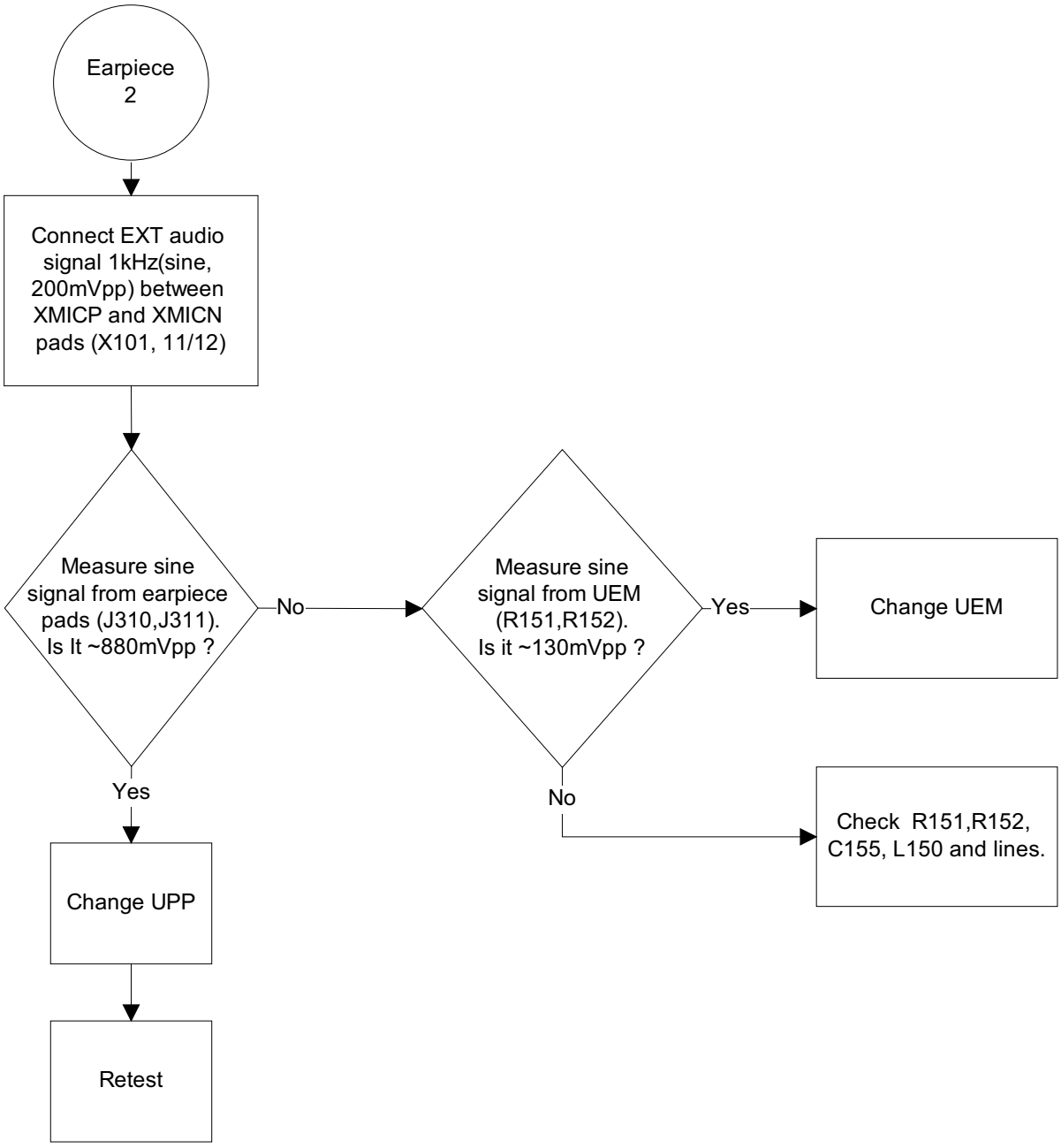
Earpiece 2
Connect EXT audio signal 1kHz(sine, 200mVpp) between XMICP and XMICN pads (X101, 11/12)
Measure sine signal from earpiece pads (J310,J311). Is It ~880mVpp ?
No
Measure sine signal from UEM (R151,R152). Is it ~130mVpp ?
Yes
Change UEM
Yes
Change UPP
Retest
No
Check R151,R152, C155, L150 and lines.

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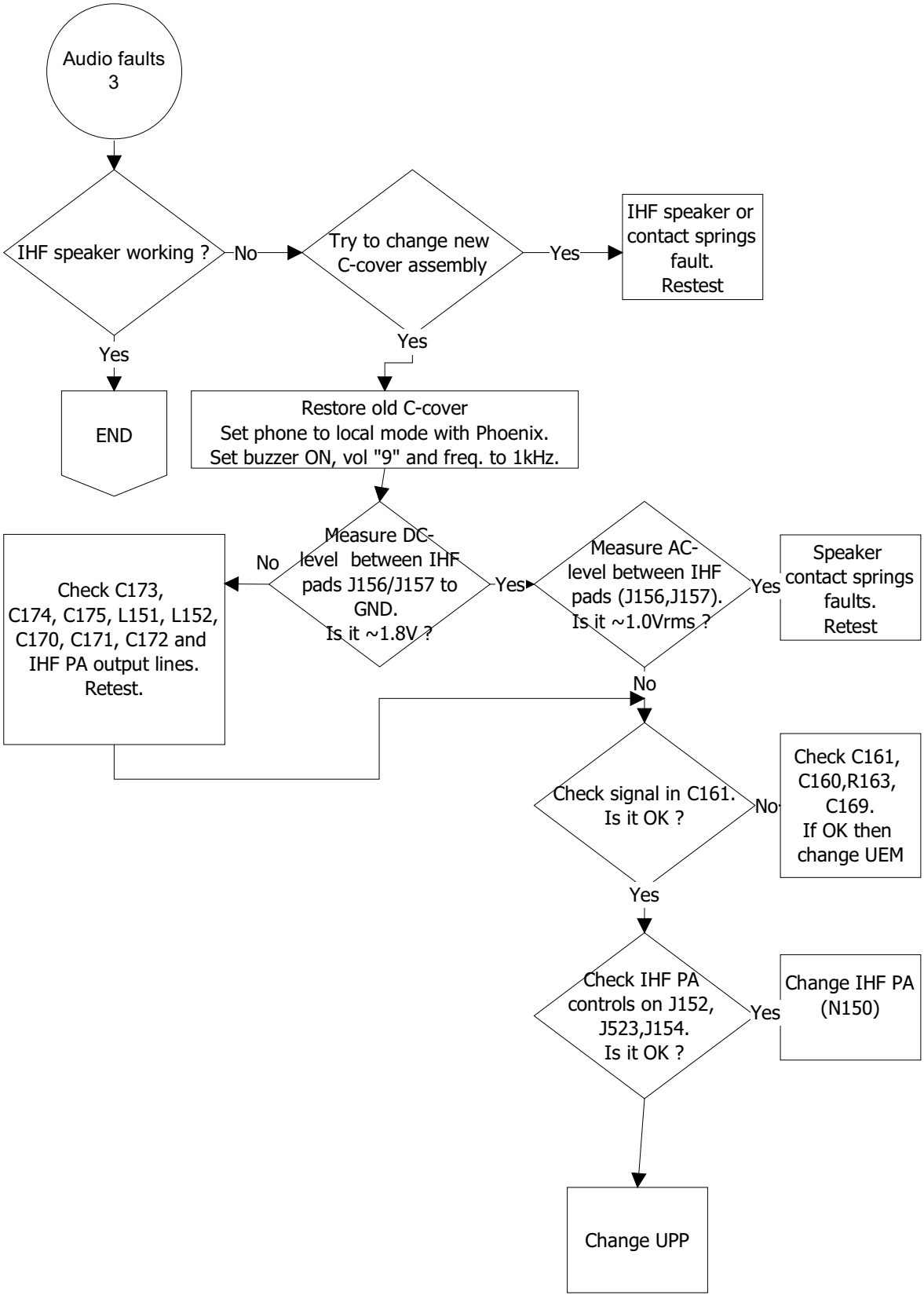
Audio faults 3
IHF speaker working ?
No
Try to change new C-cover assembly
Yes
IHF speaker or contact springs fault. Restest
Yes
Yes
END
Restore old C-cover
Set phone to local mode with Phoenix.
Set buzzer ON, vol "9" and freq. to 1kHz.
Measure DC-level between IHF pads J156/J157 to GND.
Is it ~1.8V ?
No
Yes
Measure AC-level between IHF pads (J156,J157).
Is it ~1.0Vrms ?
Yes
Speaker contact springs faults. Retest
Check C173, C174, C175, L151, L152, C170, C171, C172 and IHF PA output lines. Retest.
No
Check signal in C161.
Is it OK ?
No
Check C161, C160,R163, C169. If OK then change UEM
Yes
Check IHF PA controls on J152, J523,J154.
Is it OK ?
Yes
Change IHF PA (N150)
Change UPP

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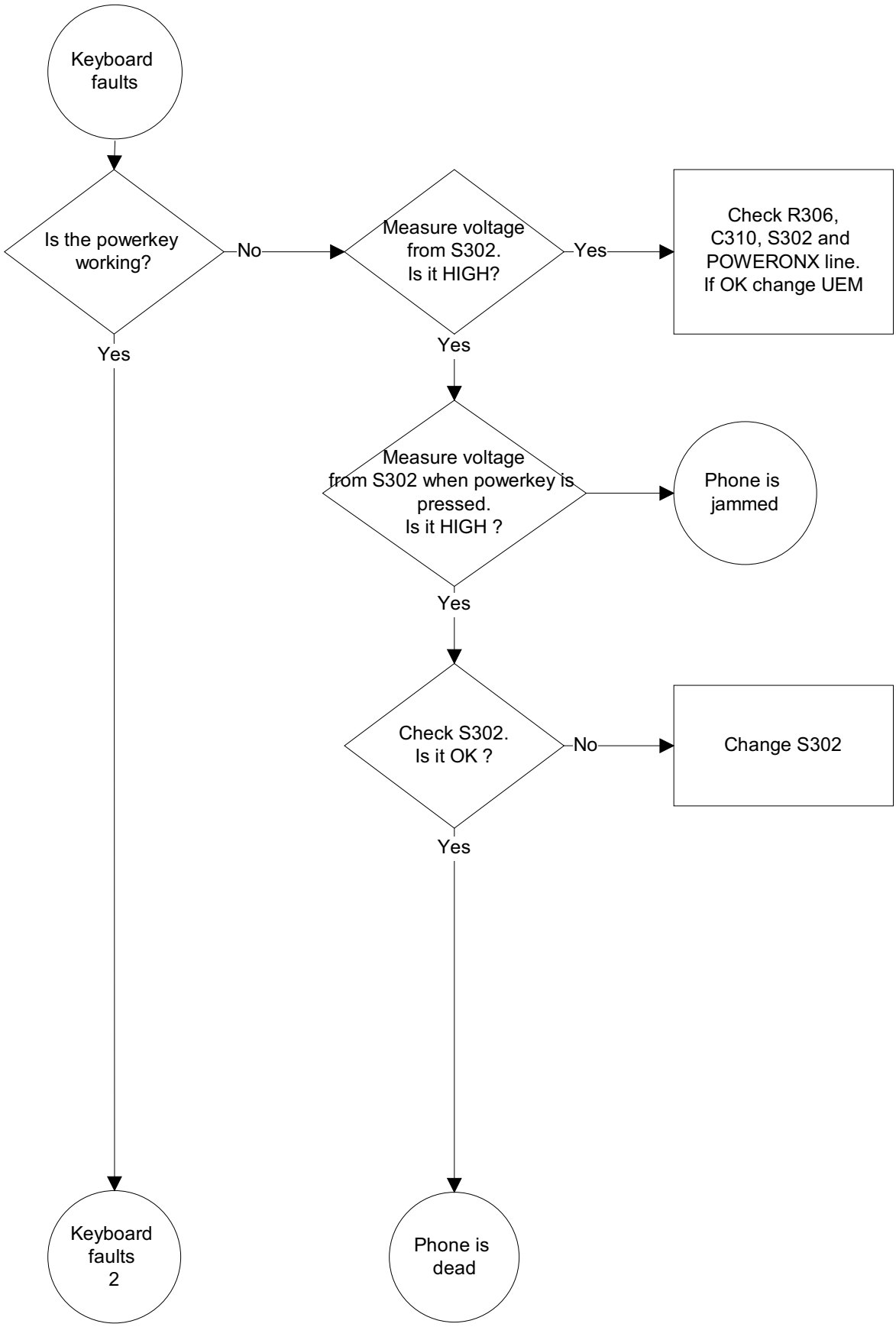

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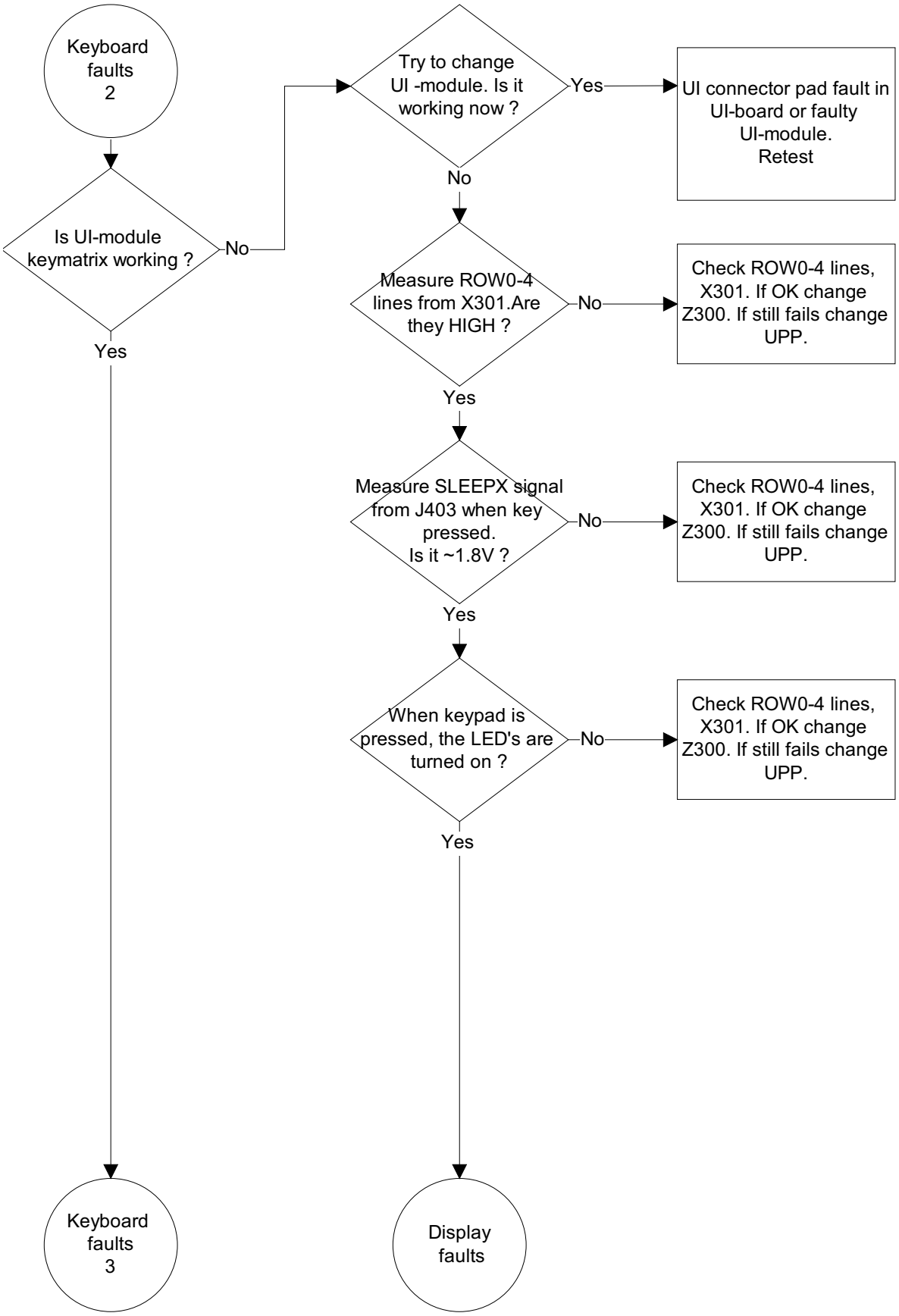
Keyboard faults 2
Is UI-module keymatrix working ?
No
Yes
Try to change UI -module. Is it working now ?
Yes
UI connector pad fault in UI-board or faulty UI-module. Retest
No
Measure ROW0-4 lines from X301.Are they HIGH ?
No
Check ROW0-4 lines, X301. If OK change Z300. If still fails change UPP.
Yes
Measure SLEEPX signal from J403 when key pressed. Is it ~1.8V ?
No
Check ROW0-4 lines, X301. If OK change Z300. If still fails change UPP.
Yes
When keypad is pressed, the LED's are turned on ?
No
Check ROW0-4 lines, X301. If OK change Z300. If still fails change UPP.
Yes
Keyboard faults 3
Display faults

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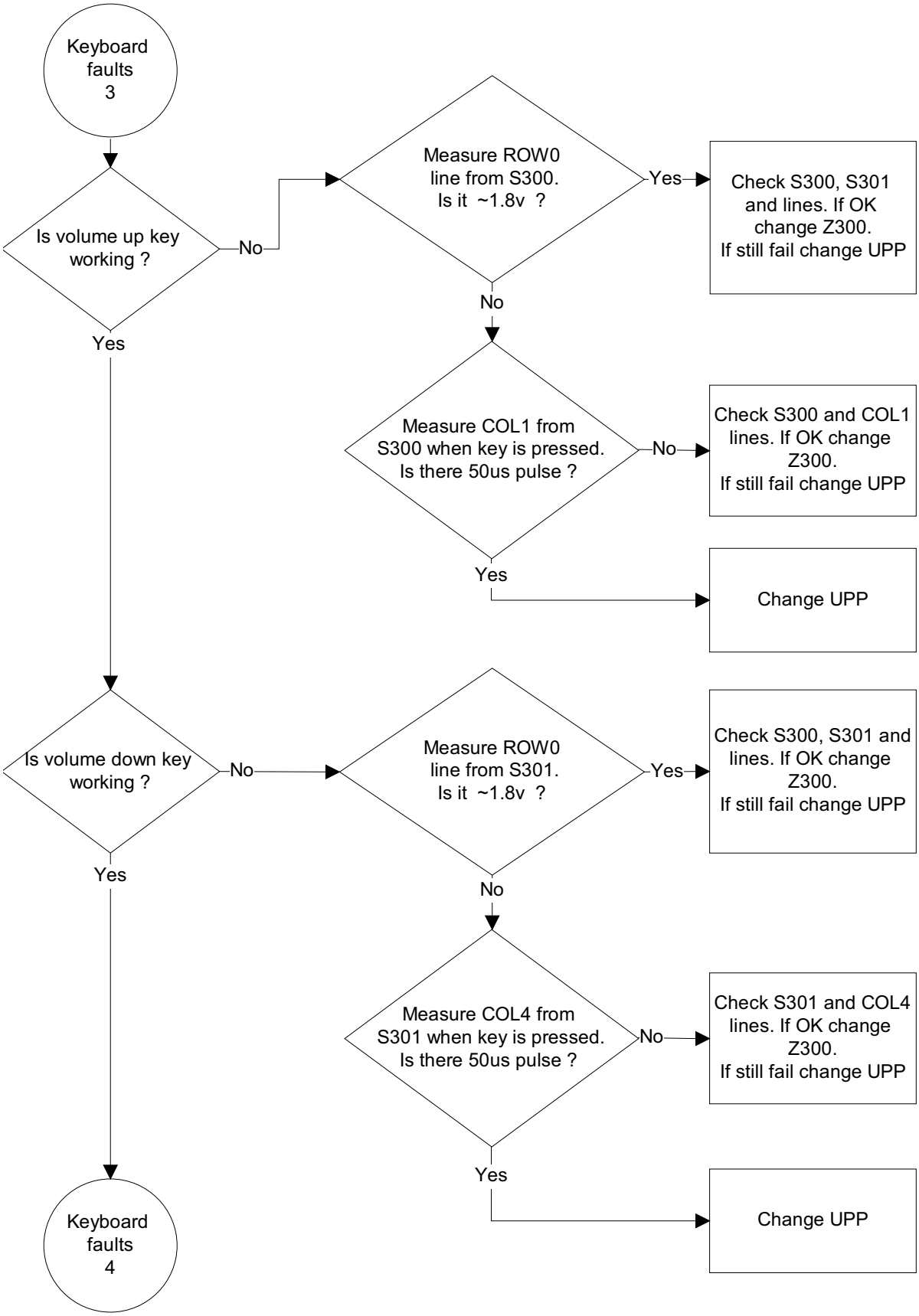
Keyboard faults 3
Is volume up key working ?
No
Yes
Measure ROW0 line from S300. Is it ~1.8v ?
Yes
Check S300, S301 and lines. If OK change Z300. If still fail change UPP
No
Measure COL1 from S300 when key is pressed. Is there 50us pulse ?
No
Check S300 and COL1 lines. If OK change Z300. If still fail change UPP
Yes
Change UPP
Is volume down key working ?
No
Yes
Measure ROW0 line from S301. Is it ~1.8v ?
Yes
Check S300, S301 and lines. If OK change Z300. If still fail change UPP
No
Measure COL4 from S301 when key is pressed. Is there 50us pulse ?
No
Check S301 and COL4 lines. If OK change Z300. If still fail change UPP
Yes
Change UPP
Keyboard faults 4

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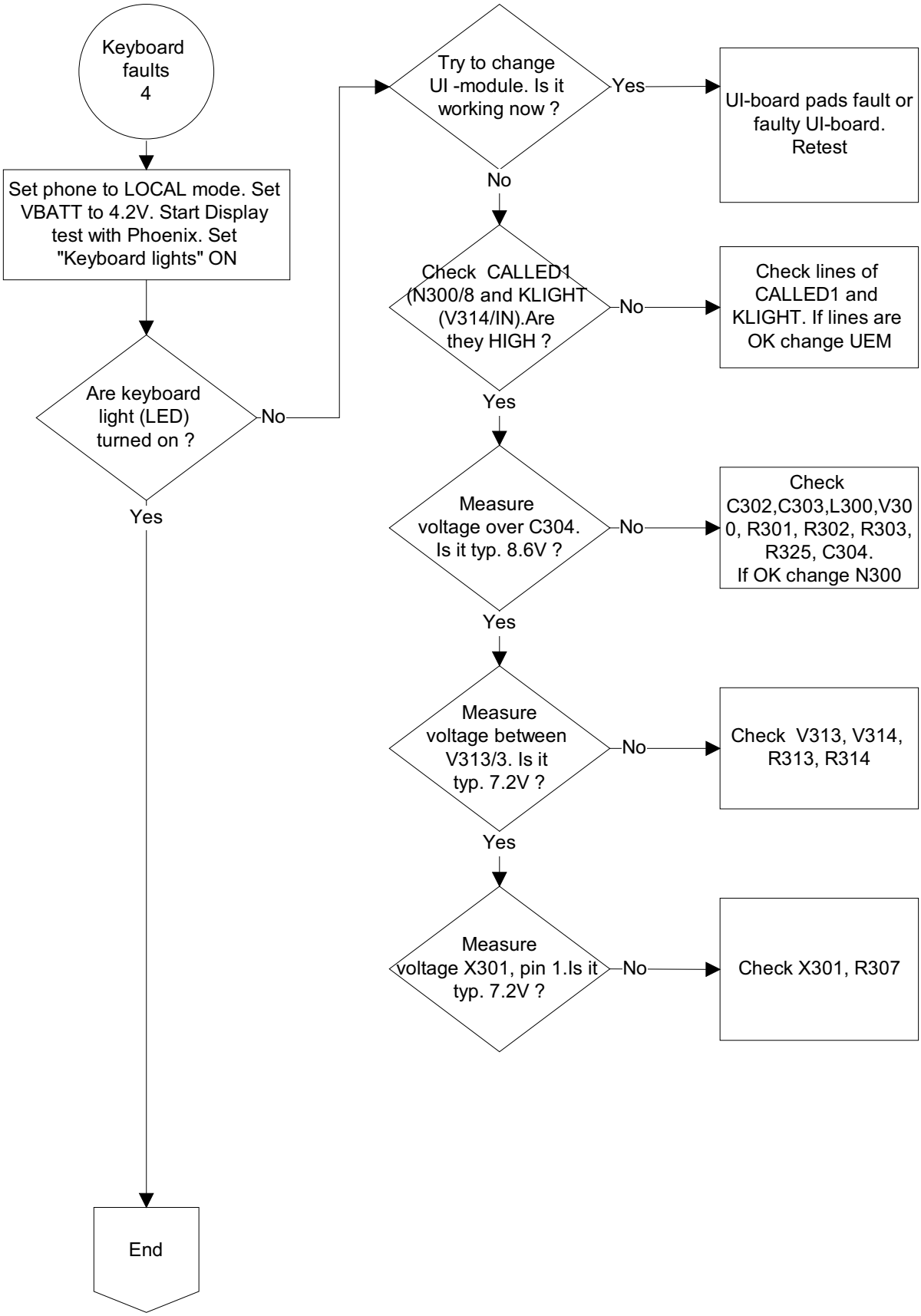
Keyboard faults 4
Set phone to LOCAL mode. Set VBATT to 4.2V. Start Display test with Phoenix. Set "Keyboard lights" ON
Are keyboard light (LED) turned on ?
No
Yes
End
Try to change UI -module. Is it working now ?
Yes
UI-board pads fault or faulty UI-board. Retest
No
Check CALLED1 (N300/8 and KLIGHT (V314/IN).Are they HIGH ?
No
Check lines of CALLED1 and KLIGHT. If lines are OK change UEM
Yes
Measure voltage over C304. Is it typ. 8.6V ?
No
Check C302,C303,L300,V300, R301, R302, R303, R325, C304. If OK change N300
Yes
Measure voltage between V313/3. Is it typ. 7.2V ?
No
Check V313, V314, R313, R314
Yes
Measure voltage X301, pin 1.Is it typ. 7.2V ?
No
Check X301, R307

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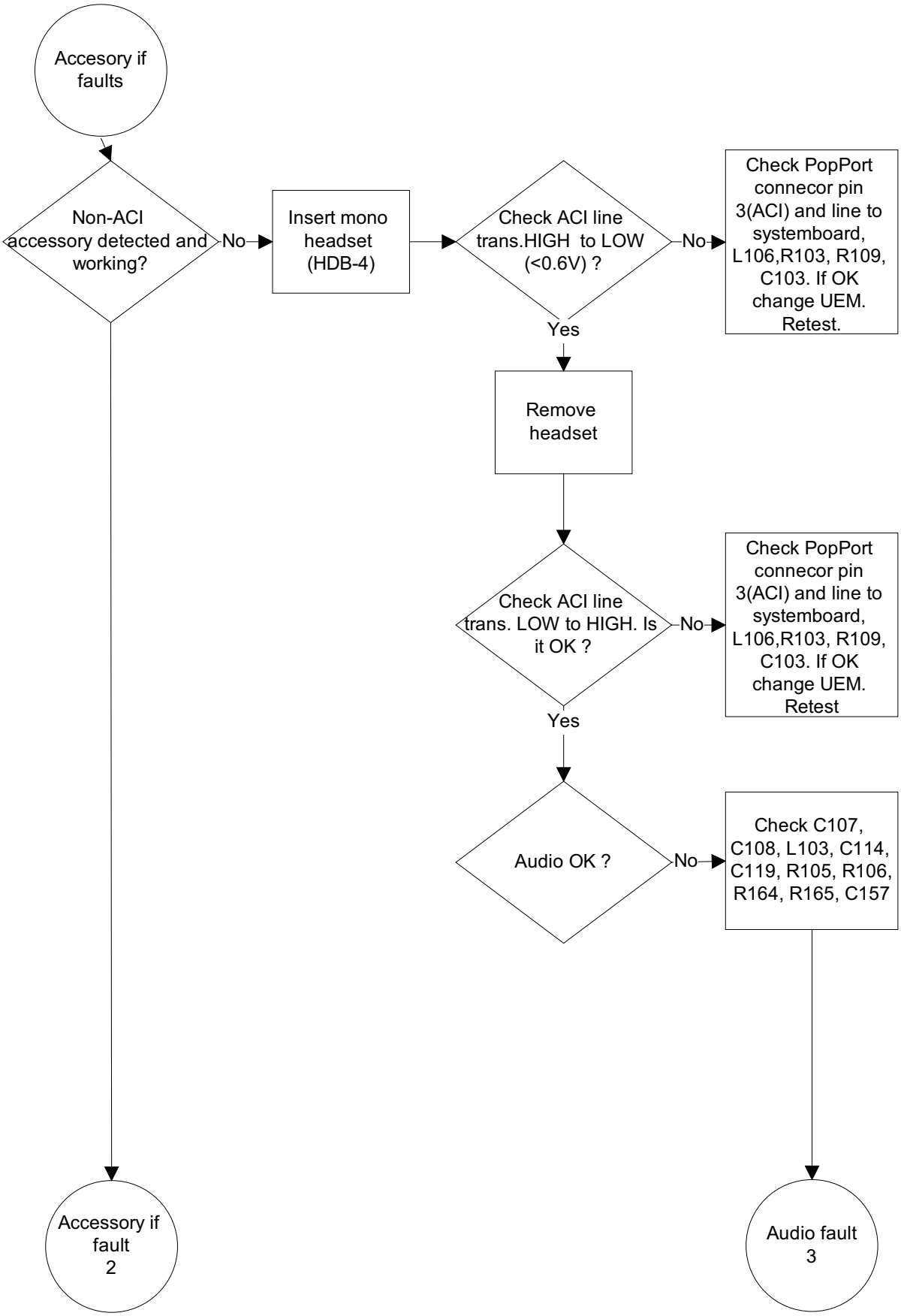
Accesory if faults
Non-ACI accessory detected and working?
No
Insert mono headset (HDB-4)
Check ACI line trans.HIGH to LOW (<0.6V) ?
No
Check PopPort connecor pin 3(ACI) and line to systemboard, L106,R103, R109, C103. If OK change UEM. Retest.
Yes
Remove headset
Check ACI line trans. LOW to HIGH. Is it OK ?
No
Check PopPort connecor pin 3(ACI) and line to systemboard, L106,R103, R109, C103. If OK change UEM. Retest
Yes
Audio OK ?
No
Check C107, C108, L103, C114, C119, R105, R106, R164, R165, C157
Accessory if fault 2
Audio fault 3

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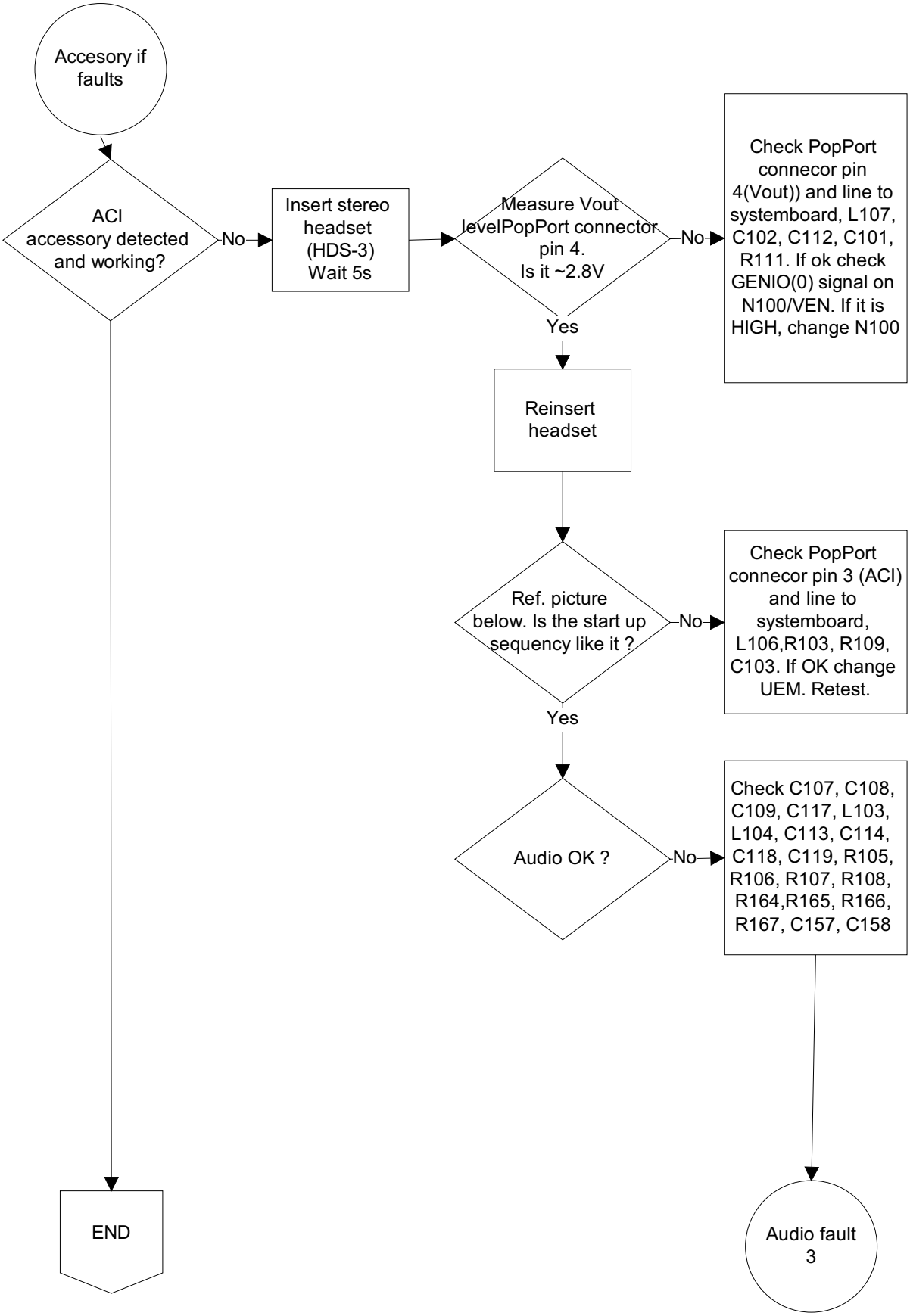
Accesory if faults
ACI accessory detected and working?
No
Insert stereo headset (HDS-3) Wait 5s
Measure Vout levelPopPort connector pin 4. Is it ~2.8V
No
Check PopPort connecor pin 4(Vout)) and line to systemboard, L107, C102, C112, C101, R111. If ok check GENIO(0) signal on N100/VEN. If it is HIGH, change N100
Yes
Reinsert headset
Ref. picture below. Is the start up sequency like it ?
No
Check PopPort connecor pin 3 (ACI) and line to systemboard, L106,R103, R109, C103. If OK change UEM. Retest.
Yes
Audio OK ?
No
Check C107, C108, C109, C117, L103, L104, C113, C114, C118, C119, R105, R106, R107, R108, R164,R165, R166, R167, C157, C158
END
Audio fault 3

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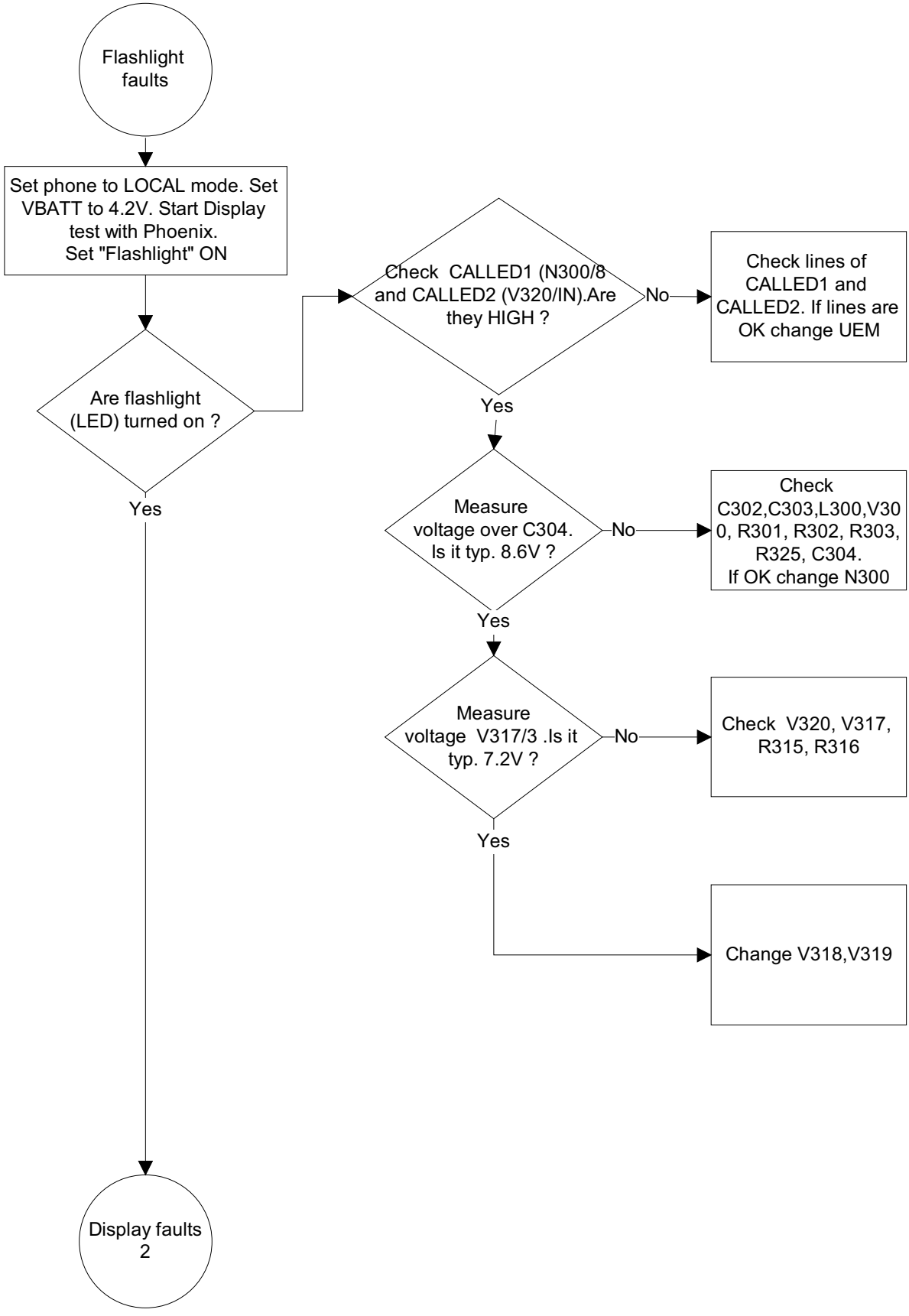
Flashlight faults
Set phone to LOCAL mode. Set VBATT to 4.2V. Start Display test with Phoenix. Set "Flashlight" ON
Are flashlight (LED) turned on ?
Yes
Check CALLED1 (N300/8 and CALLED2 (V320/IN).Are they HIGH ?
No
Check lines of CALLED1 and CALLED2. If lines are OK change UEM
Yes
Measure voltage over C304. Is it typ. 8.6V ?
No
Check C302,C303,L300,V300, R301, R302, R303, R325, C304. If OK change N300
Yes
Measure voltage V317/3 .Is it typ. 7.2V ?
No
Check V320, V317, R315, R316
Yes
Change V318,V319
Display faults 2

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Self tests
If any self test is failed, contact service information will be shown on display.
Set phone to LOCAL mode
Use Phoenix BB Self Tests. Run All
Self test show now what test are failed.

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FM Radio troubleshooting

FM Radio component layout

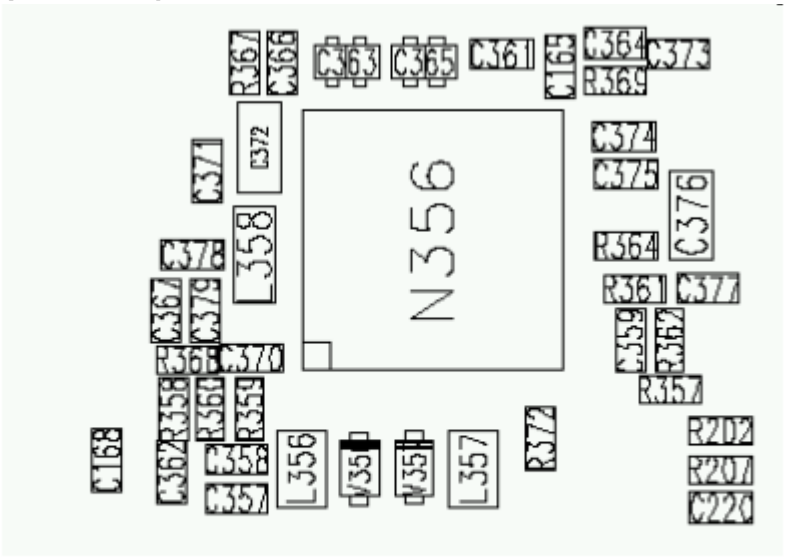

Figure 22: Component placement

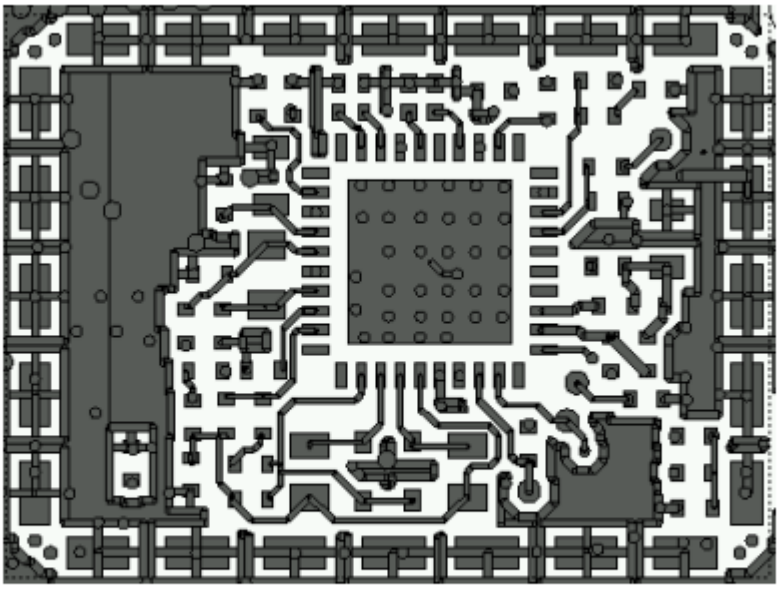

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Figure 23: Trace layout.

Figure 24: FM radio block layout.

Components L103, L104, L105, C107, C108, C109, C117, C162, C163, R164, R165, R166 and R167 are not shown in the picture. Those components are placed in baseband section, near audio amplifier N150.

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FM Radio troubleshooting diagram

Notes to "FM Radio troubleshooting diagram"

Use 1MHz 1X probe when measuring Audio and clock signals with oscilloscope.

Use active RF probe when measuring frequencies with spectrum analyzer.

Note 1. RF test signal parameters:

- Amplitude, A, –67.0 dBm
- Carrier frequency, f_c, 98,000 MHz
- Deviation, Δf, 75 kHz
- Modulating frequency f_m, 1,000 kHz (RF generator internal)
- FM stereo, mode R=L, pilot state ON

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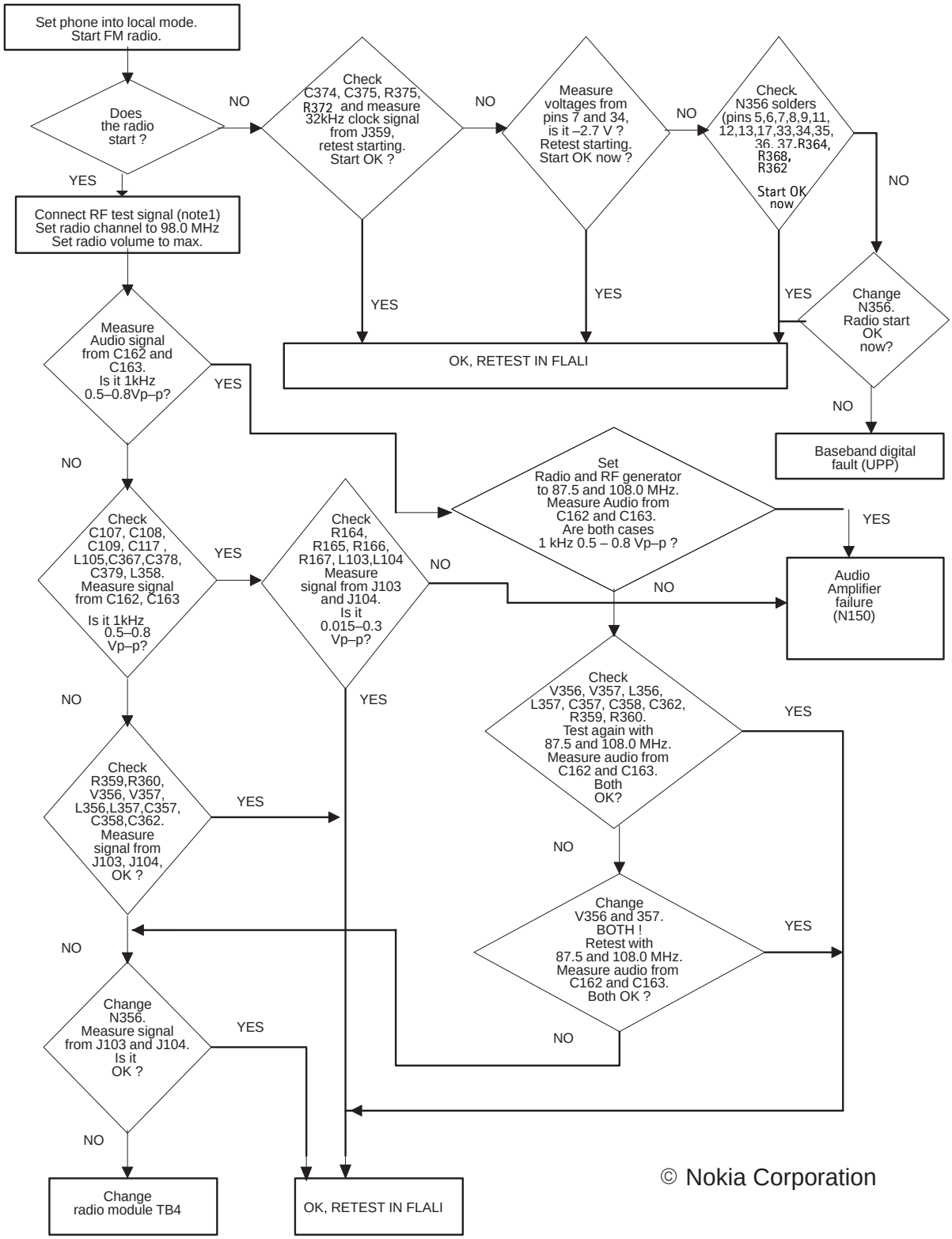
Figure 25: FM radio troubleshooting diagram


Set phone into local mode.
Start FM radio.
Does the radio start ?
NO
Check C374, C375, R375, R372 and measure 32kHz clock signal from J359, retest starting. Start OK ?
NO
Measure voltages from pins 7 and 34, is it –2.7 V ? Retest starting. Start OK now ?
NO
Check N356 solders (pins 5,6,7,8,9,11, 12,13,17,33,34,35, 36, 37.R364, R368, R362 Start OK now
NO
YES
Connect RF test signal (note1)
Set radio channel to 98.0 MHz
Set radio volume to max.
YES
YES
YES
Change N356. Radio start OK now?
OK, RETEST IN FLALI
Measure Audio signal from C162 and C163. Is it 1kHz 0.5–0.8Vp–p?
YES
NO
Baseband digital fault (UPP)
NO
Set Radio and RF generator to 87.5 and 108.0 MHz. Measure Audio from C162 and C163. Are both cases 1 kHz 0.5 – 0.8 Vp–p ?
YES
Check C107, C108, C109, C117 , L105,C367,C378, C379, L358. Measure signal from C162, C163 Is it 1kHz 0.5–0.8 Vp–p?
YES
Check R164, R165, R166, R167, L103,L104 Measure signal from J103 and J104. Is it 0.015–0.3 Vp–p?
NO
NO
Audio Amplifier failure (N150)
NO
YES
Check V356, V357, L356, L357, C357, C358, C362, R359, R360. Test again with 87.5 and 108.0 MHz. Measure audio from C162 and C163. Both OK?
YES
NO
Check R359,R360, V356, V357, L356,L357,C357, C358,C362. Measure signal from J103, J104, OK ?
YES
Change V356 and 357. BOTH ! Retest with 87.5 and 108.0 MHz. Measure audio from C162 and C163. Both OK ?
YES
NO
NO
Change N356. Measure signal from J103 and J104. Is it OK ?
YES
NO
Change radio module TB4
OK, RETEST IN FLALI
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Diagrams of FM radio signals

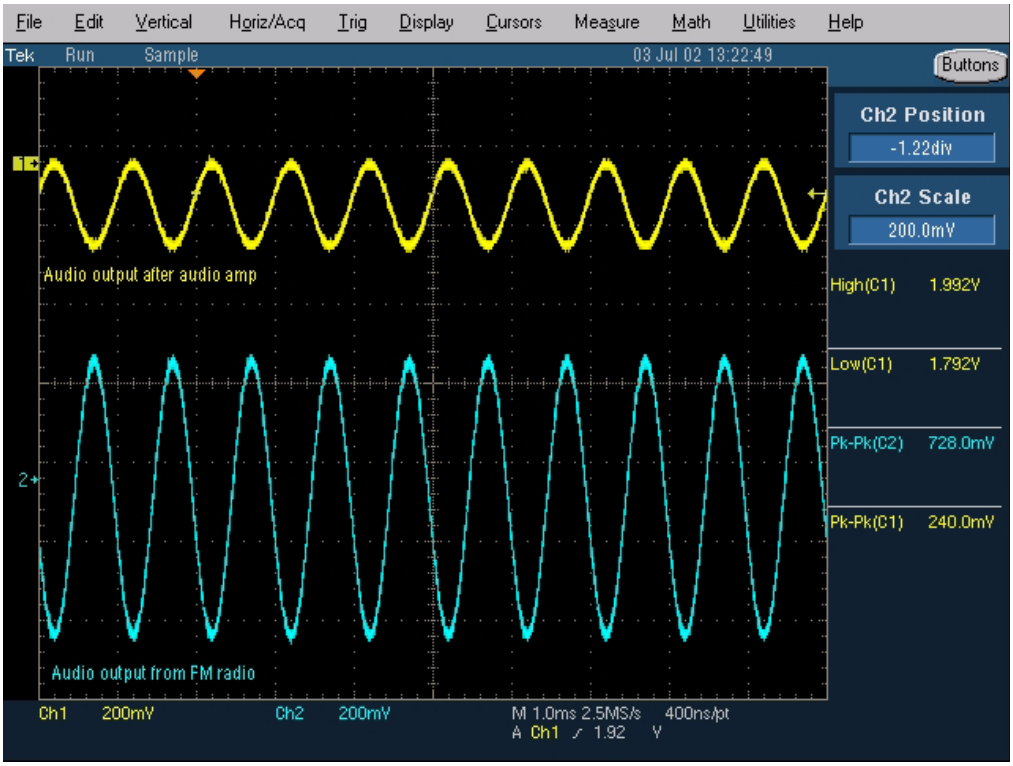

Figure 26: Oscilloscope screen shot, Audio output

Signal 1: Audio output from PWB test points J103 and J104, with FM test signal, volume 100%.

Signal 2: Audio output from FM radio pins 22 and 23(same as in C162 and C163), with FM test signal

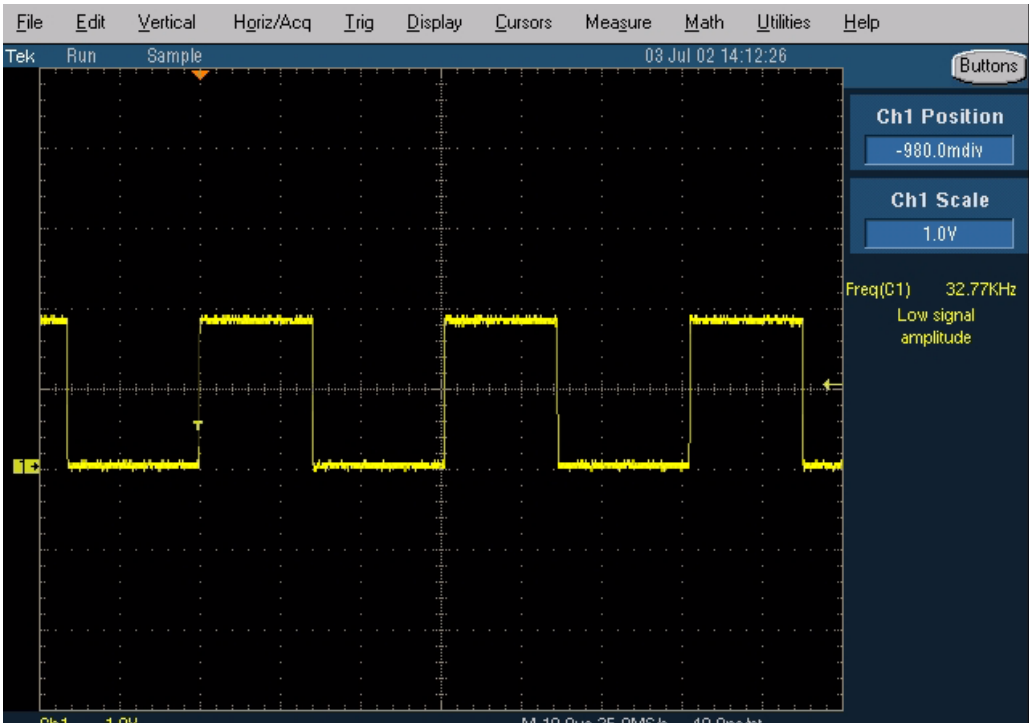

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Figure 27: FM radio clock from test point J359, 32 kHz frequency clock signal, when radio is on.

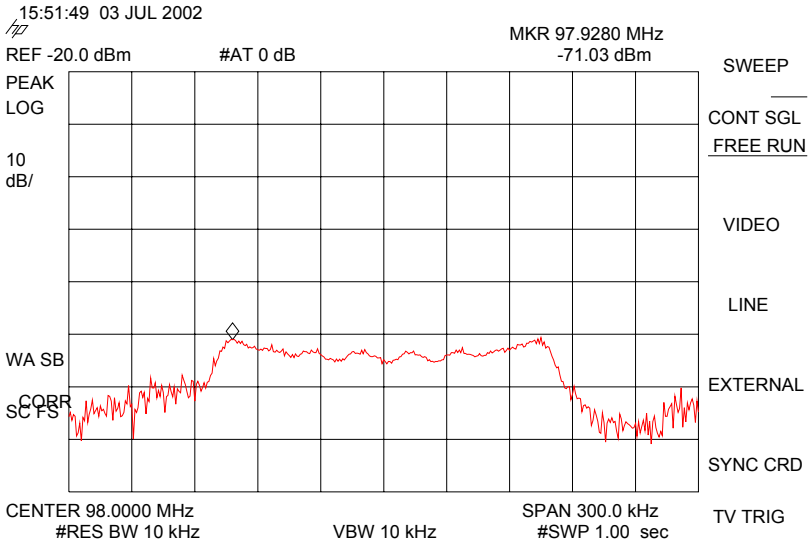

Figure 28: FM frequency from FM radio pin 37, the other end of L358, with FM test signal

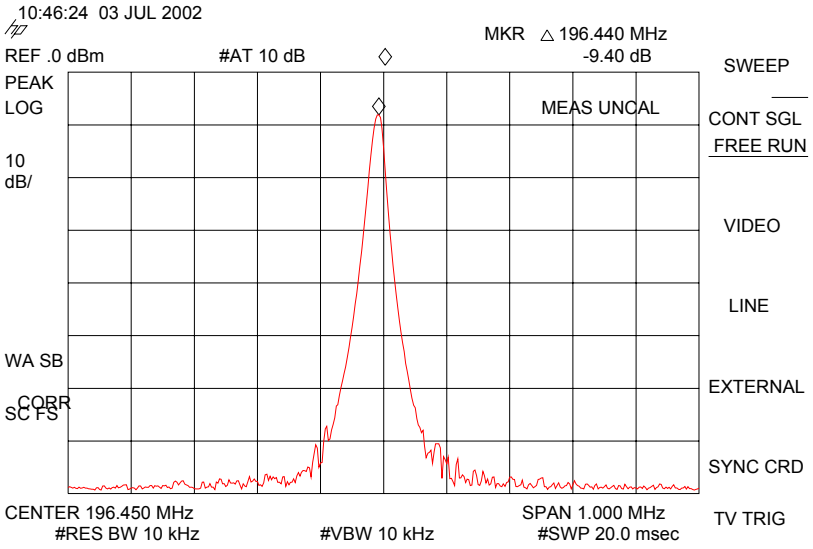

Figure 29: VCO frequency from FM radio pins 3 and 4, the other ends of V356 and V357, with FM test signal

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